SKILLS, INNOVATION AND THE PROVISION OF, AND ACCESS TO, TRAINING

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SOCIAL PARTNER RECOMMENDATIONS ON SKILLS, INNOVATION, PROVISION OF AND ACCESS TO TRAINING

KEY MESSAGES

1. Employee training is mainly the responsibility of social partners. When organising employee training, national social partners need to take into account the realities of the labour markets and the needs of workers, including changes of tasks and jobs, innovation, mobility and transitions into and between jobs.

2. Fostering a lifelong learning culture in workplaces is essential to help workers to develop in their career and to improve their employment opportunities. Improving the number of adults participating in training at all skills levels is essential in line with the 1st principle of the European Pillar of Social Rights on the right to training and lifelong learning [1] and to foster their employability, to get a higher skilled workforce adapted to rapidly evolving labour market needs, and to increase productivity and innovation.

3. Being aware of the European Commission's intention to propose a Council recommendation on individual learning accounts (ILAs), the European social partners reiterate that a one-size-fits all approach is not appropriate. There are many tools used, for example, paid educational training leaves (by law or through collective agreements), personal training accounts or training funds (cross-industry or sectoral), vouchers, etc, which all have specific objectives and target groups. A key challenge is to make these tools inter-operable. The success and inter-relation of the different tools depends on the country-specific institutional framework. However, an important pre-condition for the tools to succeed is that their existence and their functioning is well communicated to all potential users and be governed together with the social partners.

4. Innovation, that has a market and positive societal impact, will be even more crucial in the years ahead for a socially just and competitive Europe in the face of ambitious environmental targets, digitisation, health risks and demographic ageing. Therefore, it is important to strengthen and enhance social dialogue and further cooperation between Member States, social partners, enterprises and education and training institutions to ensure quality jobs, address unresolved skills mismatches and reduce skills shortages, which are damaging Europe's innovation capacity. In order to ensure that every worker is ready and equipped for the green and digital transitions, it is essential to help them to access the validation of non-formal and informal learning and provide them with training on the new skills that are needed, based on recognising and certifying their existing skills gained during previous trainings and work experiences. This will also be important for Europe's innovation potential. Therefore, enhancing access to training to improve the level and relevance of qualifications is essential.

5. Supporting more upskilling and reskilling of workers will require quality and effective apprenticeships and traineeships which can help with students' integration in the labour market. In order to foster innovation as both a top-down and bottom-up process in every aspect of work, it should include workers in all sectors and sizes of companies. Therefore, workers' training is important to improve their contribution to incremental and breakthrough innovation. It is important to strengthen collaboration between the relevant actors involved in education, training, research, innovation and labour markets. This will help to increase enterprises' capacity to innovate, bring new products to market and ultimately boost an innovation culture.

1 Everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable them to participate fully in society and manage successfully transitions in the labour market.

6. Digitalisation, greening, including efforts to reduce the carbon footprint, and the emergence of new technologies mean that occupational profiles need to be adapted and that workers need to acquire and utilise new skills. The European social partners Autonomous Framework Agreement on Digitalisation outlines measures to be considered by national social partners, such as internal and external validation solutions and the financing of training by employers when a worker is requested to undertake job-related training linked to digitalisation.

7. The European cross-industry social partners support the ongoing efforts made by the European Commission to reinforce European-level initiatives on skills, education and training with a sectoral focus. For instance, the Blueprints for sectoral cooperation on skills, the Pacts for skills in industrial ecosystems, the sector-specific platforms of Centres for Vocational Excellence contribute, amongst other things, to improve training strategies which can respond to the skills needs across sectors, hence supporting Europe's position in the key value chains and industrial ecosystems. European sectoral social partners play a key role in those EU projects. The role of sectoral social partners and dialogue in training provision could also be further enhanced through the promotion and strengthening of training funds.

RECOMMENDATIONS

To the European Commission

8. The European Commission should ensure that investments, necessary reforms and effective social dialogue aiming to foster skills development, in line with the 1st principle of the European Pillar of Social Rights on the right to training and lifelong learning, are embedded in the context of the European Semester. In this respect, the Commission should encourage the Member States to achieve this when implementing the related national recovery and resilience plans and the Council recommendation on VET, Osnabruck Declaration, EU Skills Agenda and the Strategic framework for European cooperation in education and training 2021-2030.

9. The European Commission needs to fully take into account the tripartite opinion of the Advisory Committee on Vocational Training (ACVT) on "Individual learning accounts (ILAs) and strengthening training provision in Europe" that was adopted in August 2021. In particular, ILAs are only one possible tool and should not replace existing employer or government funded and/or social partners driven provisions to training as well as others forms and modalities of training financing.

10. The European Commission, working with the Member States, should set up effective strategies to support mobility and fair transitions on the labour markets. The involvement of public employment services, complemented by private employment services is crucial. An improved training offer to inactive and unemployed people needs to be designed with the involvement of the social partners and in consultation with relevant social service providers. These activities should also take into account national social partners' advice on how public authorities and social service providers can support their actions to improve adult learning in Europe, especially for the unemployed and NEETs.

11. The European Commission should advocate for, and monitor, the meaningful involvement of national social partners in the programming, monitoring and implementation of EU funding streams that aim to support the up and re-skilling of workers, as well as enhancing Europe's innovation capacity. This particularly concerns the European Social Fund+, the Recovery and Resilience Facility, Erasmus+ and Horizon Europe.

To Member States

12. Member States should work with national social partners to ensure sufficient investment in quality, effective and inclusive skills training for all workers and improve adult education and training systems' performance to achieve progress towards the new EU headline target of 60% of adults participating in training every year by 2030.

13. Member States should contribute to ensuring a framework that is conducive to enhancing social dialogue among trade unions and employers at the national and sectoral level, taking into account national circumstances, to provide various types of education and training solutions for adult workers in times of changing labour market needs and growing unmet skills needs. In addition to this, effective skills strategies need to be based on quality research on skills forecasts, skills adaptation and skills development with the support of relevant research and education and training institutions. Such strategies need to improve the skills and competences of all workers to ensure quality jobs and to foster organisational innovation, including basic skills and key competencies, with special attention to critical thinking, creativity, problem solving, digital and ICT skills, environmental responsibility and skills for the green economy, and STEM skills.

14. Member States, with the full involvement of social partners, need to implement the Recovery and Resilience plans in a way that facilitates the access of workers to quality and inclusive training, using these plans to support the national social partners to create, strengthen and/or improve the functioning of training funds.

15. Member States need to strengthen national Continuous Vocational Education and Training (CVET) systems and financial systems to ensure access to incentives for enterprises to offer training to their workers, and for workers to participate in training, including via paid educational or training leave. Empowering private enterprises, workers, social partners and public authorities to play their full roles is fundamental to effective CVET.

16. In fostering the recovery from the impact of the COVID-19 pandemic, Member States need to fully involve social partners in reforming their skills strategies and in utilising the financial resources that are available under EU financial instruments and support, in particular the Recovery and Resilience Facility, Horizon Europe and the Cohesion funds. In this context, the European Social Fund+ plays an important role in supporting the up and re-skilling of workers. Member States need to ensure meaningful cooperation with, and involvement of social partners in the programming of the European Social Fund+ for the period 2021-2027 and that they have access to use these funds.

17. Member States need to continue efforts to reduce drop out in VET and adult learning also in the context of the current pandemic. It is also important to reduce early school leaving so as to ensure that those who enter the labour market have a sufficient level of basic skills and key competences, and professional skills which are the foundation for further and continuous learning.

To social partners

18. National social partners should work together to best identify how to ensure effective access and entitlement to training, taking into account their existing education and training practices in a way that addresses the long-term needs of individual workers and enterprises due to the recovery from the impact of the COVID-19 pandemic, greening of economies and digitalisation. The particular role of social dialogue and collective bargaining at the appropriate levels needs to be strengthened in all the countries where social partners agree that this is needed. National social partners should utilise EU and national funding opportunities, notably in the context of implementation of National Recovery and Resilience Plans. Social partners should develop action at cross-industry and/or sectoral level to find solutions that contribute to the successful workforce adaptation to the digital and green transitions.

19. National social partners, with the support of their national governments where relevant, should explore the establishment or further development of training funds, taking into account national circumstances, as a key instrument to further support training provision and innovation. These training funds, when well designed, can support skills development and address the skills needs of enterprises and workers. Well-functioning training funds are often co-managed by the social partners and where this is not the case an appropriate involvement of social partners needs to be foreseen as part of the governance. Training funds can contribute to quality, effective and inclusive life-long learning and employee training that supports workers to innovate, to appropriately utilise and further develop their skills relative to their job that they hold or, in particular where they are cross-industry, to transition within the labour market, including between sectors.

20. National social partners should strengthen their cooperation to ensure that national skills strategies are based on and delivered through effective social dialogue. In parallel, social partners should also develop their cooperation with education and training providers in order to facilitate the process of updating occupational profiles in a timely and effective way relative to identified needs. Social partners shall be involved in skills intelligence (e.g. on skills forecasting, update of occupational profiles, etc) in order to link labour market needs with education and training curricula and qualifications and to enable workers and enterprises to anticipate and support changes and innovation related to the green and digital transitions. This will support enterprises to be more innovative and productive, as well as ensuring the creation of quality jobs that improve the working conditions of their employees.

21. National social partners should work together to fully implement the Autonomous Framework Agreement on Digitalisation in order to ensure a connection between training and innovation while managing the digital transition in a joint partnership approach.

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EXECUTIVE SUMMARY

The aim of this report is to analyse how to improve the different training systems and ensure inclusive, quality and effective skills provision and long-term skills strategies as a way to foster innovation and in order to encourage better innovation outcomes through the engagement of social partners.

- Up-skilling and re-skilling of workers is essential in order to enhance innovation, which is crucial for improving the employability, well-being and working conditions of workers and the competitiveness and productivity of enterprises. This is particularly important in view of the digital and green transitions, as well as to solving pressing social challenges.

- The topic of employee training for enhancing innovation in companies has generated a vast body of research over the last decades There is an increasing tendency for linking skills and innovation strategies within the EU and national policy developments with the involvement of social partners.

- The European social partners have previously underlined the importance of innovation, skills, provision of, and access to, training as key factors in fostering competitive enterprises and in creating and retaining jobs. Among these are the industry 4.0 revolution together with game changing technologies digitalisation, skills mismatches, social, demographic and environmental transitions. The European social partners most recent work in this regard concerns the Framework Agreement on Digitalisation [1] and the joint report and recommendations on promoting the role of social partnership in employee training [2].

- Enterprises and workers play a crucial role in innovation and the development of new skills and competences provided by employee trainings, and which are crucial for adapting to a changing environment. Therefore, the provision of, and access to, employee training that responds to employers' and workers' needs for developing innovative technologies and business models and that enables workers to find and maintain jobs in line with their skills, expectations and competences is vital.

Part1 of the research on *taking stock of workforce skills and innovation* presents an analysis of the relationship between innovation, skills and training. It also demonstrates that the methods and areas in which the social partners can intervene to enable innovation are very heterogeneous.

Part 2 of the research focused on *Provision of and access to training to support innovation: The role of social partners and collective bargaining.* Following research conducted with the member organisations of the European cross-sectoral social partners, as well as sectoral social partners, the involvement of social partners in employee training varies strongly across countries. While in some countries social partners are heavily involved in the definition and management of the training system, they have a more limited involvement in others. The research revealed that it is at sectoral level that the involvement of social partners in workplace training (design, delivery, funds allocation, evaluation) is strongest.

With the increasing importance of adult learning, the importance of explicitly including training and lifelong learning in collective agreements, notably at the sectoral level, increases as well. Indeed, in many countries, collective agreements have started addressing issues related to the future of work and their implications for the organisation of work as well as the quality of the working environment. Moreover, collective agreements play an important role in determining the modalities around the provision

1 EUROPEAN SOCIAL PARTNERS (2020), Framework Agreement on Digitalisation. Full-text available at: <https://www.businesseurope.eu/sites/buseur/files/media/reports_and_studies/2020-06-22_agreement_on_digitalisation_-_with_signatures.pdf.

2 R. FLAKE ET AL., (2018), Promoting Social Partnership in Employee Training. Final Report. This study is carried out by the German Economic Institute as a subcontractor within the EU cross-sectoral social partners' (BusinessEurope, CEEP, UEAPME and ETUC) Integrated Projects of the EU social dialogue 2016-2018. It is supported by funding from the European Commission. Full-text available at https://www.businesseurope.eu/sites/buseur/files/media/reports_and_studies/2018-06-18_employee_training_final_report_v2.pdf.

of and access to training and provide a framework that can motivate people to seek training actively. Collective agreements in the area of employee training can be a good way to ensure that employers (organisations) and trade unions constructively work together on this topic.

The part of the research on *Game changing technologies and innovative approaches to the identification of new skills* shows that according to data from the survey of cross-sectoral and sectoral social partners half of the respondents reported that workers entering the labour market for the first time lacked the skills needed in the specific sector or company. In parallel, nearly all respondents observed that workplace training plays an important role in developing these skills. These findings are particularly important in combination with the view that employment services were broadly considered to be ineffective in fostering training opportunities to adapt to new and emerging skills needs, including skills for innovation.

As concerns the identification of skills needs and, therefore further training opportunities, more than half of respondents noted that skills assessment and/or forecasting was undertaken at company level or with the involvement of social partners. The interviews with national social partners provide more detail of these practice.

Concerning *Financial incentives for research and development and skills investments,* the research revealed that training funds while being very heterogeneous in the EU, have been found to be the principal financing tool that social partners draw on for the purpose of developing strategic skills for work. Also in this case, sectoral training funds, usually set up to respond to specific sectoral (and interprofessional) training needs, were found to be among the most effective tools to enable a better match between demand and supply of skills, also in terms of anticipation, actively involving employers' organisations and trade unions also in terms of evaluating their effectiveness. The survey also revealed that two thirds of respondents said that their organisation or company has not been involved in measuring the effectiveness of incentives for training in terms of skills development and strengthening of innovation.

Within the part on *Cross-thematic findings,* the involvement of social partners in employee training varies strongly across countries. While in some countries social partners are strongly involved in governing and managing the training system, they have a limited involvement in others. The role of collective bargaining also varies, but is particularly pronounced at sectoral level.

Skills anticipation methods also vary across the EU; the main ones are skill assessments, forecasting and foresight. Data sources also vary; methods used can influence the data available and vice versa. Some methods are better at describing the current skill supply and demand situation; others at providing long-term projections. Therefore, different forms of skills anticipation have a role to play in shedding light on short-, medium- and long-term skill issues.

Pathways to recognised qualifications are becoming more and more diversified across European countries. In many European countries, publicly subsidised programmes leading to recognised qualifications are offered for free – this may contribute to lowering financial obstacles to participation. Various demand-side financial support measures are available across Europe; however, these generally do not specifically target low-qualified adults.

The research has identified the updating of job profiles and curricula as a further research area to be explored. This is important for better understanding the interplay between skills needs and innovation processes and to be a relevant coordination mechanism for improving the match between demand and provision of education, training and learning.

INTRODUCTION

The topic of skills, innovation and training has generated a vast body of research over the last decades across several disciplines including innovation studies, sociology, economics, economic history, psychology and education. More recently it has also attracted increased interest from public policy makers, including top-level authorities (ministries responsible for education, employment, social affairs, home affairs, etc., and various national agencies), authorities at lower decision-making levels (e.g. regions, municipalities) and a variety of other actors (e.g. social partners, education and training providers, non-governmental organisations).

Accordingly, this report does not only encompass an exhaustive review of the existing literature; rather its purpose is to provide a concise critical overview of the major themes and data on the role of workforce skills in innovation in Europe and the role of training therein with a focus on a selected number of countries, adopting both a national analysis lens and a comparative approach. A particular focus is to provide an understanding of three main topics: (1) provision and access to training to support innovation: the role of social partners and collective bargaining; (2) game changing technologies and innovative approaches to the identification of new skills; (3) financial incentives for research and development and skills investments.

This overview adopts an inclusive definition of 'skills' as it is taken to encompass the range from the abstract concept of 'knowledge' to concrete occupationally specific attributes and competencies.

A key finding of this report is that overall, the evidence supports a strong interrelation between the supply of higher levels of education, training and skills and increased demand for and supply of technological and organisational innovation.

STRUCTURE OF THE REPORT

This report is made up of five chapters which are divided into three main parts.

The first part takes stock of workforce skills and innovation, discussing the complementarity of education, training and innovation through the analysis of skills and innovation definitions and approaches to the study of these topics. Subsequently, there is a detailed overview of three thematic issues (Part 2). Drawing on findings gathered through statistical and literature reviews, complemented by first-hand information collected through an online questionnaire and an in-depth interview phase, the following issues are covered : provision of and access to training to support innovation: The role of social partners and collective bargaining (Chapter 2), Game changing technologies and innovative approaches to the identification of new skills (Chapter 3), Financial incentives for research and development and skills investments (Chapter 4). Lastly, through a comparative lens, there is a cross-thematic overview of selected countries performances under the three main domains covered by the research (Part 3).

METHODOLOGY

The present report makes use of the findings of thematic reports and discussions at the thematic seminars [3] delivered and carried out in the context of a two-year European cross-sectoral social partners' project on skills, innovation, and provision of, and access to, training.

The three thematic reports and seminars have been structured around the themes:

- Provision of and access to training to support innovation: The role of social partners and collective bargaining
- Game changing technologies and innovative approaches to the identification of new skills
- Financial incentives for research and development and skills investments.

Each of the reports has been drafted consistently with a multi-method methodological approach. In the first instance, a literature and a statistical review were conducted simultaneously [4]. In order to integrate the information collected through the background desk research, interviews were conducted among member organisations of social partners seeking good (and less successful) cases and practices at the enterprise, sectoral and national level, taking into account social partners' agreements on innovation, skills, provision of and access to training, including the effectiveness of employee training in meeting changing needs of employers and workers and how social dialogue and the participation of workers can contribute to the innovation process. To this end, online in-depth semi-structured interviews have been carried out and 39 in depth-interviews have been finalized [5]. Moreover, an online questionnaire [6] has been designed and disseminated to a sample of respondents belonging to the member organisations of the European social partners. The survey has been drafted in English, French, Italian and Spanish to reach a broader number of respondents and to avoid the risk of a low rate of feedbacks due to possible linguistic barriers. The survey was completed by 64 respondents with an adequate balance in terms of feedback received by trade unions and employers' organisations' representatives and encompassing both sectoral and company level responses [7]. Alongside the three main issues covered by the research, for each topic (specifically through interviews, survey, and seminars) an assessment of the impact of the Covid-19 pandemic emergency on skills, innovation and training has been developed.

In terms of geographical coverage, the report adopts a European wide perspective with the following specifications: 15 countries have been the focus for the identification of good and less good practices through desk research and contacts with national social partners (Austria, Bulgaria, Denmark, Estonia, France, Germany, Italy, Luxembourg, the Netherlands, Poland, Portugal, Romania, Spain, Sweden, United Kingdom). Stemming from this list, six countries have been subject to an in-depth comparative analysis. These six countries are: Sweden, Germany, Estonia, France, Italy, Romania. The selection of countries is the result of a mapping exercise carried out in strong collaboration with European cross-sectoral social partners.

3 Due to the persistence of the Covid-19 health emergency situation, all the seminars took place online.

4 During the literature review drafting process, the available literature on the topics to be covered by the three thematic reports other relevant published material have been examined, synthesised and critically analyzed by identifying gaps in current knowledge, showing limitations of theories and points of view and by formulating areas for further research and reviewing areas of controversy. Besides scientific contributions, pertinent institutional documentation and social partners' publications have been considered and quoted in a manner consistent with the objective of this task. With reference to the statistical review, it is worth mentioning that understanding how innovation takes place in firms (also through the lens of the training proxy) and how it contributes to economic growth and prosperity is a major policy preoccupation. The worldwide statistical community, led by the OECD and Eurostat, agreed in the early 1990s to co-develop a statistical approach to support the measurement of innovation in firms. This framework, known as the Oslo Manual, has been used in more than 80 different countries, with national statistical organisations and research institutes adapting the core set of guidelines to country-specific idiosyncrasies and user needs. Thus, during the initial phase of the research process, a reference taxonomy of relevant statistical indicators prior to the issues covered by the project has been created based on the Oslo manual, further taking note of the most recent available data repositories and implementing the consolidated resources frequently used in similar investigations with the aim of operationalising innovation and training concepts like 'skills' and 'innovation' which could be vague and highly subjective. The cooperative approach was the one used by the research team to identify the sources of literature and the statistical indicators to be used to implement this desk research phase. In this regard and also with reference to the subsequent research phases, the dialogue with the social partners was constant throughout the duration of the project.

5 The interviews with national/sectoral or enterprise representatives have been carried out on the basis of recommendations from national and European social partners. The number of interviews does not correspond to the number of interviewees since in six cases multiple-respondent interviews have been completed. Interviews' guidelines are available in Annexes, together with a full overview of interviewees and survey respondents with breakdown by country and sectors.

6 The survey has been distributed using the Google Form platform.

7 Each project partner has been involved in the identification of reliable contacts to engage both in interviews and in the questionnaire.

The list of countries included in the mapping [8] exercise and in the overall research process has been designed (1) considering comments and suggestions made during the initial stage of discussion with the European cross-sectoral social partners and (2) taking into account innovation and training assessment tools and indicators which are usually chosen as proxies to analyse innovation and training performances and monitor progress to define EU innovation and training related policies. Namely, the main sources informing the list of countries (which are consistent with the indicators used to finalise the statistical review paragraphs included in the thematic sections of this report) are:

- the European Innovation Scoreboard (latest edition [9]);
- the Social Scoreboard for the European Pillar of Social Rights (latest available online data for each selected indicator);
- the Digital Economy and Society Index (DESI).

8 For further details concerning the procedure for selecting countries see Part 3.

9 During the writing of this report, the 2019, 2020 and 2021 versions were consulted. The 2019 version provided the basis for the selection of indicators, while the two subsequent publications were used for the collection of secondary data.

PART 1.
TAKING STOCK OF WORKFORCE SKILLS & INNOVATION

PART 1. TAKING STOCK OF WORKFORCE SKILLS & INNOVATION

This chapter briefly describes the various disciplinary approaches within the social sciences to the subject of skills and innovation and reasons for the growing academic and policy concern with the subject. It also examines the contentious issue of defining workforce skills and analyses the concept of innovation, focusing in particular on how the various forms of innovation, such as the distinction between incremental and breakthrough innovation, affect the supply of and demand for different skills, knowledge and occupations.

1. DEFINING SKILLS FOR INNOVATION

1.1. Defining skills

The general concept of skills refers to productive assets of the workforce that are acquired through learning activities. The literature, however, does not concur on a robust and accepted definition and classification of skills beyond this general characterisation.

Without the ambition to be exhaustive, but considering the main sources guiding the research behind the present report and constituting its methodological framework, the most important indicators to be found in the literature are:

- Employment distribution by level of occupation *(Reich, 1990; Cully, 1999).*
- Employment distribution by educational attainment *(Colecchia and Papaconstantinou, 1996).*
- Wage differentials by educational attainment or occupation *(Goldin and Katz, 2007).*
- Measuring change in the job tasks and attributes required to perform a job *(Howell & Wolff, 1991; Esposto, 2008).*
- Surveys of employers or employees to determine skill levels required to perform jobs *(Felstead, Gallie and Green, 2002).*

The overall conclusion of most studies over the last three to four decades, with some important exceptions, is that "[r]egardless of the measurement of skills...demand for high-skilled labour has risen since the 1970s. This trend is observed in both the manufacturing... and the service sector...as well as in the aggregate economy. The higher the skill level of jobs or occupations, the greater the skill upgrading is likely to be" (Kim, 2002: 91).

In many studies skills and skill levels are defined as some combination of education, training and experience (Machin and Van Reenan, 1998; Tether et al, 2005; Pro Inno Europe, 2007). This approach is taken by many national statistical agencies in the classification and definition of occupations for the collection of labour market data. These occupational classifications also, on occasion, include a cardinal ranking of occupations from most to least skilled based, for example, on the period of training required for entry into the occupation and/or years of experience to achieve competency in the occupation (Australian Bureau of Statistics, 2006a).

Other studies have highlighted important inter-country differences in the meaning, scope and delivery of skill, which, in turn, have implications for the capacity of the workforce to engage in innovation. For vocational or intermediate occupations it has been argued that there are important differences between the Anglo-Saxon conception of vocational skills, which may not be directly related to the possession of a qualification and with a strong element of on the job training, and that in continental Europe, especially Germany, Netherlands and France, where people are trained in the specific skills that are required for a set occupation within an established learning pathway leading to a qualification.

Not only is there substantial variation in the conception of skill across countries, there is also a recent tendency for researchers and policy makers, especially in Anglophone countries, to expand the range of tasks, knowledge and abilities that are deemed to be required to deal with new technologies and pace of innovation. It is commonly argued that in addition to obtaining specific technical skills workers in different occupations are increasingly required to develop a broad range of what are variously termed

'generic', 'transferable' or 'employability' skills (HM Treasury, 2004; Sheldon and Thornthwaite, 2005; Tether et al, 2005; Taylor, 2006; Martin and Healy, 2008). The scope of these skills typically includes communication (verbal and written), numeracy, IT, team work, problem solving and learning to learn. These required attributes are also on occasion expanded to include leadership, motivation, discipline, self-confidence, self awareness, networking, entrepreneurship and capacity to embrace change. These skills are regarded as generic or transferable since they are "seen as having a broad application across a wide range of employment contexts and as transcending individual subjects" and are argued to be the basis for a "flexible" and "multiskilled" workforce (Keep and Payne, 2004: 57).

Rising demand for generic skills is argued to be a response to the application across most industries of ICT technologies requiring common or standardised skills. Widespread adoption of more efficient work organisation methods, such as lean production across both manufacturing and service industries, is also argued to demand the workforce acquire a broader range of skills.

Skills such as problem solving and team work are actually acquired in the course of developing occupationally and firm-specific skills, and accordingly "the primary location for the creation and development of higher order work skills remains the workplace" (Keep and Payne, 2004: 68). Moreover, the incorporation of separate instruction in generic skills into existing educational and training courses for the workforce, such as degrees or occupation-specific training, runs the risk of displacing valuable occupationally or task specific technical content. Taking into account variations in the skills needed in specific occupations and sectors, there is a general need for workers to possess a mix of transversal and occupation-specific skills. Workplace learning, in particular, offers good opportunities for learners and workers to acquire such a mixed skills set.

1.2. Defining innovation

The purpose of this section is firstly to provide a concise account of the concept of innovation, highlighting the great variety of economic, technical, and organisational activities it encompasses. It emphasises the important fact that the propensity and intensity of investment in innovation is not uniform across an economy,but varies considerably across categories such as industry and firm size. These, in turn, generate enormous diversity of workforce skills required to implement these activities. Finally, it draws on some key concepts from the innovation studies literature to describe different processes of innovation and how they affect the demand for different skills. A key message to emerge from this analysis is that there is no 'one size fits all' model for undertaking innovation or for the type of skills required for successful innovation..

The conceptual framework for data collection on innovation defines this activity as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations" (Oslo Manual, third edition, OECD and Eurostat, 2005: 46). In other words, while an innovation results from an investment in R&D, innovation is the realisation of its economic and societal potential.

A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. Product innovations can utilise new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies.

Product and/or service innovation entails activities such as design, research and development, acquisition of patents, technology licenses, trademarks, and tooling-up and industrial engineering.

A process innovation is the implementation of a new or significantly improved production or delivery method. This includes significant changes in techniques, equipment and/or software. Process innovations can be intended to decrease unit costs of production or delivery, to increase quality, or to produce or deliver new or significantly improved products.

A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales.

An organisational innovation is the implementation of a new organisational method in the firm's business practices, workplace organisation or external relations. Organisational innovations can be intended to increase a firm's performance by reducing administrative costs or transaction costs, improving workplace satisfaction (and thus labour productivity), gaining access to non-tradable assets (such as noncodified external knowledge) or reducing costs of supplies.

A social innovation is the design and implementation of new solutions that imply conceptual, process, product or organisational change, which ultimately aim to improve the welfare and wellbeing of individuals and communities. Social innovations aim at providing solutions to socio-economic and environmental problems.

Research and Development (R&D) [10] is a part of innovation activity. The conceptual framework for data collection on R&D defines this activity as 'creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications' (Frascati Manual, 6th edition, OECD 2002b).

Presenting an overview of the discussions about the indicators to be considered to measure the level of innovation at the country level is beyond the scope of this section. However, the proxies of interest for a mapping of the interrelationships between skills, training, research and innovation (also at company level) will be presented in the chapters dedicated to thematic issues.

1.3. Benefits of higher skills for innovation

The previous section identified a range of arguments put forward to explain rising interest in the subject of skills and innovation. This section summarises the main arguments put forward in the literature to explain the contribution of skills to innovation. Whilst there are several distinct disciplinary approaches to the study of skills and innovation (outlined in section 1.4 below) the arguments regarding the benefits and contribution of higher skills to innovation are generally common across these approaches.

1.3.1. Accelerating technical change

There is argued to be a virtuous circle between increased investment in workforce education, investment in knowledge creation, such as fundamental research, and an increased rate of implemented technical change. The principal mechanism in this virtuous circle is the unusual properties of knowledge [11]. Firstly, unlike standard economic goods, knowledge, conceived as a factor of production, is not subject to diminishing returns and does not depreciate as each increment in knowledge adds to the total stock of knowledge. Secondly, knowledge is non-rivalrous in that it can be employed by multiple producers simultaneously without affecting producers' costs. Another aspect of its non-depreciation and non-rivalry is that having been acquired by a producer it can continue to be used indefinitely so that its marginal cost effectively falls to zero. Knowledge is also non-excludable in that there are either no limits imposed by property rights on the use of knowledge or these rights are of finite duration (Arrow, 1962a) [12].

10 R&D entails three activities: (1) basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view; (2) applied research is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective; (3) Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed (OECD 2002b: 30).

11 The following arguments are well known and are mentioned in summary form only. A useful account is provided in Dowrick (2003).

12 A great deal of knowledge may well be 'free to use' but this does not imply that knowledge is a 'free good'. As Callon (1994) has shown there are degrees of non-rivalry and non-excludability and often significant private and public investments required to make knowledge non-rivlarous and non-excludable. The most important example of these private and public investments is education. Callon also makes the point that whilst knowledge does not 'wear out' or depreciate in a manner analogous to capital equipment there are however considerable costs in its storage. Arrow deals with 'knowledge' at a very high level of abstraction, which also hides the fact that much knowledge is 'sticky' in that it is not easily transferred. For example, knowledge may be sticky because it is context dependent, say the operation of a unique industrial process or the information may be only tacitly understood.

Thirdly, education, knowledge and skills have the property of a network externality, that is to say, the value in acquiring knowledge by any one user increases at a rate proportional to, or even greater than, the rate of increase in the number of other users. In other words, the productivity of any worker is enhanced not only by their individual level of skill but also by the average skill level amongst their fellow workers. Fourth, knowledge is a joint-product of production: expanding output also increases the accumulation of knowledge through learning by doing (Arrow, 1962b). Knowledge is thus both an input and output of production and innovation.

In summary, these various properties of knowledge have been used to argue that the growth of knowledge is subject to increasing returns, that is, "knowledge acquired per unit of time is greater if the stock of publicly available knowledge is larger" (Prescott, 1998: 541). In addition, the growth of knowledge raises the productivity of capital investment when it is embodied in more recent vintages of physical capital goods and software. In turn, this is claimed to account for the presence of increasing returns to capital investment at an economy-wide level, as evidenced by the long-run increase in the capital-labour ratio (Romer, 1994).

These various properties of knowledge have also been used to explain important long-run trends, especially rising workforce educational attainment, rising R&D intensity (R&D as a share of value added) and increase in the breadth of technologies subject to R&D by large individual firms [13].

1.3.2. Adapting to technical change

A related, but somewhat different argument relates higher skills to a faster rate of technical change, in that empirical studies show "that more highly-educated individuals tend to adopt innovations earlier and implement and adapt them sooner than less-educated individuals" (Kim, 2002: 92). This applies both to the consumption of new technologies, for example in the home, and in production. More educated and skilled workers are argued to have greater 'functional flexibility' in that their greater stock of knowledge increases the rate at which they learn and develop higher order problem solving skills. This greater functional flexibility is also argued to be important for innovation at a macro-economic level, as more educated persons are better able to cope with rapid structural change induced, for example, by international trade or innovation. An indicator of this is the strong positive relation between educational attainment and labour force participation and strong negative relation between higher educational attainment and rates of unemployment (HM Treasury, 2004: 8).

1.3.3. Complementarity of education, training and innovation

It is well established that the propensity [14] of firms to provide employer-funded training and the intensity of this training increases markedly the higher the initial educational attainment and prior training of its workforce (Arulampalam and Booth, 1998; Wolbers, 2005). For example, Draca and Green's (2004) study of the Australian workforce in the 1990s finds that the probability of workers with degrees or higher qualifications receiving employer funded training is close to two-thirds higher than persons whose highest educational attainment is a basic vocational qualification and around 50% higher than persons with trade qualifications or who had completed high school. The number of hours of training received by managers, professionals and associate professionals is

13 Firstly, growth in the 'volume' of knowledge requires ever higher workforce skills to identify, assess and implement new knowledge. Secondly, the complex input-output relations that typify large firms require them to keep up to date not only with technological advances in inputs from a multiplicity of supplier firms, but also to constantly devise new uses and improvements to their own products and services which are also typically used as inputs by a multiplicity of firms across many industries. One measure of this tendency is the growing propensity for large firms to engage in R&D and patent activity across a range of industrial classifications that is much wider than the industrial classification of the products or service they make (Patel and Pavitt, 2000).

14 Propensity to train is the proportion of all firms in a given category, such as industry or firm size, that provide workforce training. For firms that do train intensity is typically measured as total training costs as a proportion of total sales or value added. Source: OECD (2011).

nearly three times more than persons in clerical occupations and more than five times that of tradespeople. They conclude that "there are substantial complementarities between education and training" (Draca and Green, 2004: 622). Similar magnitudes are reported in Arulampalam and Booth's (1998) study of the UK labour market. This complementarity is attributed to a range of factors that make it more profitable for employers to invest in training persons with higher initial education, such as the more educated having better learning skills and lower marginal training costs compared to those with less education.

Further there is an association between the propensity of firms to innovate and the probability of them providing workplace training. There are two major reasons why this should be so. Firstly, the characteristics that are positively associated with a high propensity to undertake innovation are also associated with a high propensity to provide employer-funded training (Toner et al., 2004). These characteristics include, for example, large firm size; foreign ownership; high capital intensity, especially in machinery and software and industry classification. (Industries such as property and business services, manufacturing and telecommunications have a high propensity to both innovate and train, whereas other industries such as construction and retail have a low propensity for both activities). Secondly, when a firm introduces a new product, service, production process or organisational change, new workforce skills are often required.

This complementarity of education, training and innovation suggests a virtuous circle whereby a workforce with a higher initial level of education stimulates employers to further develop their productive capacity through training and both of these improve the capacity of the workforce to deal with technical change[15]. Conversely, persons with low educational attainment are much less likely to participate in either employer-sponsored training or invest in their own training (HM Treasury, 2004: 26). A vicious circle is evident whereby low initial educational attainment constrains further acquisition of knowledge and capacity to engage in innovation[16].

What can enterprises and policymakers do to promote learning – and also innovative capacity – in enterprises? Research shows that two CVET factors have a positive impact on innovation performance, at least at country level:

- learning-conducive work environments (leading to workplace learning);
- more formal and organised modes of CVET (such as CVET courses).

Learning at the workplace, through learning-conducive work environments, plays a major role (Cedefop, 2012; OECD, 2010). Several respondents involved in the interview phase advocated for this type of work environment referring to them in terms of "culture" as an essential element both for workers for contributing to enhancing the enterprise and sectors innovation performances and fostering innovation in broad terms. (Eu-level, Italy, Portugal, Austria).

The European Working Conditions Survey (EWCS) conducted by Eurofound every five years covers learning-relevant issues of work organisation (such as task complexity) and reveals the extent to which employees in Europe are working in environments that encourage learning while working (Eurofound, 2020). Enterprises can support learning while working through a variety of measures:

- **task variety and complexity:** involving employees in a variety of tasks that give them novel or challenging work situations. Engagement in the full work process (phases of planning and organising as well as implementing and assessing one's own work and correction) are beneficial. With complex work tasks, the need for reflection and thinking processes grows, (implicitly) motivating employees to acquire the necessary knowledge, skills and competences;

15 One study that investigated the links between training, innovation and labour productivity based on large scale surveys of workplaces found that controlling for a broad range of variables, such as industry and firm size, "training and innovation are likely to occur in workplaces experiencing strong labour productivity growth". In turn "labour productivity growth appears to be enhanced by the joint introduction of training and innovation. This is due to the fact that training requires the support of innovation to benefit labour productivity growth. Conversely, introducing innovation in isolation is sufficient to promote labour productivity growth, although its returns are increased by the addition of training" (Laplagne and Bensted, 1999: 46).

16 The so-called "low skills trap" will be further discussed in Chapter 2.

- **autonomy in employees' scope for action and decision, such as the freedom to exercise control over work processes.** High autonomy includes the ability to choose or change the method of work, the order of tasks and the speed or rate of work;
- **team work:** working together with others, employees may observe and learn new practices from others. At the same time, they are confronted with new perspectives, which encourage them to challenge and reflect on their own routines and practices;
- **learning climate and culture:** organisations need to establish suitable hierarchies and administrative structures and encourage an organisational culture which is marked by principles of transparency, openness and cooperative leadership (Hundt, 2001). The more open a company is, and the more it is characterised by sharing power, the more eager the employee is to apply his/her skills to the work and to deal with challenging tasks; this, in turn, increases learning (Marsick and Watkins, 2003; Roßnagel, 2011). Problems such as work pressure and high workloads may have negative effects on learning;
- **mentoring, in a trusted one-to-one relationship between a professional, more advanced person (mentor) and a less experienced employee (mentee).** The mentor supports the mentee for purposes of knowledge, skills and competences development and improving performance at individual, team or organisation level by providing advice, feedback and the voice of experience and by creating learning opportunities (Ellinger et al., 2011).

1.4. Approaches to the study of skills and innovation

As noted in the introduction, the topic of skills and innovation has been studied from many different academic disciplines each with distinctive methods and assumptions. Comparative international studies find that the acquisition of high-level intermediate skills by a large proportion of a workforce depends on a set of interlocking institutional arrangements governing not just training but also industrial relations, industry policy, education and welfare. Moreover, this literature provides strong evidence to demonstrate how higher-level workforce skills directly affect the capacity of individuals and firms to engage in product and process innovation. Finally, it has been suggested that for a range of reasons, such as increased global competition, employers are increasingly adopting organisational innovations which require employees to attain higher level technical skills and a broader range of skills in order to implement 'high performance work systems'.

1.4.1 The impact of technological change on skills and innovation

Over recent decades much research has been devoted to explaining what appear to be a number of paradoxes in skills and innovation. First, in Anglo-Saxon countries in particular, there has been a trend for the real wages of the more highly educated to rise relative to persons with lower educational attainment. That is to say, the financial return from additional years of education increased. This is despite the fact that the rate of growth of the university educated workforce has grown at a much faster rate than for the workforce as a whole (Lafer, 2002: 45). Expressed another way, what accounts for the capacity of the economy to absorb such a rapidly rising quantity of inputs to production. The second principal paradox in the labour markets of developed economies is that, despite an increase in the demand for skills, there has been a decline in the share of 'middle skill' occupations in total employment and a rise in the share of lower skilled occupations (Goos and Manning 2003). [17] The latter include occupations such as cleaners, drivers, department store sales people, fast food operatives and other personal service workers. Technological change causing growth of employment at the top and bottom of the labour market and decline in the middle is also a factor in growing income inequality in countries such as the U.S. (Johnson 1997). The first apparent paradox can be resolved if it can be shown that there has been a large and sustained increase in the relative demand for more highly skilled labour. The factor that is behind this increase is 'skilled biased technical change (SBTC)'- a pattern of technical change over several decades which "has favoured the wage and employment prospects of relatively skilled workers, while simultaneously damaging the wages and

17 Other paradoxes are also to be found in the literature. Why have the returns to education increased given the accelerating pace of technical change and the inherent obsolescence of formal qualifications implied by this? One solution, described earlier, is that higher levels of education create a general ability to adapt to technical change. In addition, if the returns to education are so obvious why has not the rate of investment by firms and individuals in education and training been even higher? The standard Human Capital explanation is that:
I. Externalities prevent firms from capturing all the benefits of investment in training and this leads to firms under-investing in training (for example, workers finding employment with another employer after having received training);
II. Inadequate information as employees and employers cannot judge correctly the benefits of training; and
III. Credit constraints, in particular, for lower-paid individuals or for small organisations.

employment of the less skilled" (Machin and Van Reenan, 1998: 1215). SBTC results from 'a significant complementarity of skills with new technology' (Machin and Van Reenan 1998: 1216). Over the years studies of SBTC have employed a number of measures of increase in technical change. These include for example, inputs to technological change, such as change in R&D intensity of firms and industries (Machin and Van Reenan, 1998; Colecchia and Papaconstantinou, 1996); investment in computers and software (Krueger, 1993); investment in machinery and equipment (de Laine, Laplagne and Stone, 2000) or output measures such as number of patents generated (Kim, 2002: 93). Measures of 'upskilling' include increases in the proportion of persons with post-school qualifications and/or increase in the proportion of persons in skilled white collar jobs (professional, managerial, and associate professional), and skilled blue collar jobs (technicians and tradespersons).

In many of the early studies of SBTC the precise mechanism linking a rise in a proxy for technical change, say R&D, with an increased demand for skilled workers was not well specified, and the analysis typically relied on the strength of a statistical association between the two variables. Later studies, especially those focusing on investment in computers, or ICT more broadly, provide a plausible chain of causation from technical change to a change in the skill and occupational composition of the workforce (Autor, Levy and Murnane, 2003; Goldin and Katz, 2007). The basic argument is that many 'routine' tasks, whether manual or service activities, can be reduced to a set of programmable rules and the outcome of these activities, if not the exact task itself, can be replicated by a computer or computer controlled machine. By contrast higher-level skills, be they manual or cognitive are 'non-routine' in that they are mostly non-repetitive and cannot be reduced to a set of unambiguous rules. Some of these skills embody 'tacit' knowledge, which even the user of such knowledge cannot express. In Karl Polanyi's famous aphorism "we know more than we can say". In such cases decision-making cannot be reduced to a computable algorithm but relies on experience and judgement. 'The capability of computers to substitute for workers in carrying out cognitive tasks is limited...Tasks demanding flexibility, creativity, generalized problem-solving and complex communications – what we call non-routine cognitive tasks – do not (yet) lend themselves to computerization' (Autor, Levy and Murnane, 2003: 5).

Job polarization is reinforced by two other effects of technological change on routine jobs. These are the 'offshoring' of routine middle-skill jobs, such as manufacturing, clerical and administrative jobs from developed to developing countries and then importing these outputs to developed economies (Goldin and Katz, 2007; Goos, Manning and Salomons, 2010). Second, a decline in the real price of routine low skill goods and services, even assuming a modest price elasticity of demand for these goods and services, increases their demand and output. This decline in the relative price of lower-skill routine goods and services is due to the productivity enhancing effect of ICT and use of lower priced 'offshored' inputs. "[R]outinization will result in larger falls in prices in industries that historically used a lot of routine labor, and this will tend to benefit all labor that is used in these industries" (Goos, Manning and Salomons, 2010: 30).

Over recent decades a more nuanced understanding of the effect of technology on the labour market and demand for skills has developed, based on the evolving concept of skill biased technological change. This has proven a persuasive and influential explanation of key developments in the demand for skills in advanced economies. These developments include a rising proportion of the workforce with higher levels of educational attainment, polarisation in the demand for skills and occupational competition of the workforce and, in some countries, growing income inequality.

1.4.2. Institutions and national differences in skill formation regimes

The central role of incremental innovation, or the use and adaptation of existing knowledge and techniques to improve the stock of products, services and processes, would strongly suggest that VET occupations, especially at trade and technician level, should be key agents in this process. The purpose of this section is to very briefly describe the factors that influence firstly, differences across advanced economies in the proportion of the workforce with higher level VET qualifications and skills and, secondly, the extent of the involvement of the VET workforce in innovation. It will also look at the role of social partners. The literature on the institutional foundations of national skill formation regimes identifies three broad types of intermediate skills formation systems; 'occupational', 'internal' and 'flexible'. In summary, the literature suggests that national intermediate training systems

are the product of a complex historical process which create 'institutional complementarities'. These are a set of self-reinforcing institutions, which create economic incentives and legal and social obligations on workers and firms to invest in particular forms of workforce training and for firms to adjust their production systems and products to these particular types and level of skill (Hall and Soskice, 2001)[18]. Each of these systems has distinct effects on the type and level of VET skills; participation of direct production workers in innovation and the type of innovation conducted within these systems.

Training can contribute significantly to the employability of individual employees as well as to the innovation potential of enterprises. More specifically, from an individual's perspective, the objectives range from keeping up employability and reducing the risk of unemployment, personal development, preparation for new tasks to preserving the job satisfaction. From an enterprise's perspective, increasing productivity, innovation and creativity, introducing new technologies, improving competitiveness or employer branding are important motives for offering training. To achieve these aims, training offers need to be of high quality and transparent and its provision needs to be effective and efficient. Social partner organisations contribute to these three dimensions in Europe significantly, although in different ways depending on the existing institutional settings. For example, social partners are involved in the updating of formal training regulations and/or in the development of new professions in some countries. In doing so, the social partners identify and bundle skills needs which influence the training regulations. If in addition, the training market is flexible these changes can be implemented quickly. If, as in Denmark, social partners are responsible for updating IVET and CVET curricula, they can respond very flexibly to changes in skills demands, which are implemented quickly by the training providers. However, Portuguese social partners are also involved in updating the national competence catalogue, but due to an inflexible training market these changes do not lead to changed training offers.

In some countries, the social partners also act as training providers or are members in the advisory board of important providers (as, for example, in Austria, the Netherlands, or Denmark). In the Netherlands, the social partners cooperate with VET schools so that social partners as providers react quickly and flexibly to the changing skill needs. In Austria, the employers' associations and the trade unions are represented in the board of the most important training providers[19].

1.5. Reasons for increased institutional, academic and policy interest in skills and innovation

Over the last four decades there has been intensified interest in the subject of skills and innovation. The reasons for this increased interest include the following items which will be further addressed in the context of thematic issues analysis below:

- **Rising educational attainment**
  Across developed and developing countries substantial increases have occurred in both educational attainment of the workforce and share of the workforce employed in higher skilled occupations, typically identified as managerial, professional and associate professional occupations (Kim, 2002: 91). This is conventionally attributed to changes in production technology and work organisation methods which, it is claimed, require higher level skills.

- **Skill shortages**
  As a consequence of the rising demand for higher level skills many nations and sectors experience skill shortages across a broad range of occupations that typically require university or other post-school qualifications for entry. These shortages are argued to reflect 'supply side' inadequacies within educational institutions given their failure to deliver a sufficient quantity and quality of trained persons. These training institutions are also claimed to under-perform in the delivery of 'generic' or 'employability' skills (Muelemeester and Rochat, 2004). Just as rising educational attainment is claimed to be a direct function of new technologies, conversely, skill shortages are argued to restrain the capacity of economies to innovate (Hayward and James, 2004: 2). [20]

18 There is not the space to discuss the historical origins of these three systems but an excellent account is provided in Thelen 2004.
19 R. FLAKE ET AL. (2018). Op. Cit.
20 See next page.

- **Demographic change**
  Declining population levels and aging demography in Europe are argued to exacerbate skills shortages and potentially threaten long-run economic growth.

- **Improving skills attainment and enhancing training provision**
  Higher workforce skills and associated investment in training, product, process and organisational innovation is promoted by the European Union as a strategic response to making the EU more competitive vis-a-vis other world regions (HM Treasury, 2004; Muelemeester and Rochat, 2004; OECD, 2007). As part of this, it is important to better incentivize enterprises to offer training and workers to take up training opportunities.

- **A mixed skills profile**
  Attracting and retaining a sufficiently skilled workforce, including through up and re-skilling as well as workers participation in continuous product and process improvement, is an important factor in enhancing the productivity and innovation potential of enterprises, . This is argued to require not only mastery of occupationally specific competencies but also an understanding of the theoretical principles and knowledge that underpin routine tasks, as well as a broader set of transversal skills, as discussed previously. This broader understanding is necessary to engage in creative problem solving and experimentation (Keep and Payne 2004: 55). Other skills include literacy and numeracy; facility with computers; verbal communication skills and capacity to engage with external suppliers or customer.

- **Technological convergence**
  ICT has also led to the convergence and integration of technologies in production systems requiring both higher level technical skills and multiskilling (Kim, 2002: 92; Tether et al., 2005; Taylor, 2006).

- **Changing industrial structure**
  Rapid changes in the industrial structure, with consequent rapid shifts in the demand for different types and levels of skills, has increased incentives for individuals to acquire adaptable and 'transferable' workforce skills (Kim, 2002: 92; HM Treasury, 2004).

- **Consumer demand**
  Changing patterns of consumer demand, especially the move towards more design intensive, higher quality and customised products and services, is argued to require higher level skills in the production and delivery of these commodities.

- **Contribution of skills**
  Academic studies have been influential in quantifying the contribution of skills to economic growth. These studies have demonstrated firstly, the strong positive association for individuals between educational attainment and earnings. This is interpreted as a direct result of the higher productivity of more educated or highly trained workers. Secondly, growth accounting techniques have established the large contribution of investment in workers and the expansion of knowledge in explaining the enormous differences in per capita income across developed and developing countries (Romer, 1994).

20 While not denying the importance of competence in undertaking tasks such as communication, numeracy, ICT use, problem solving and continuous learning, nor their important role in innovation, it has been suggested that the concept of generic skills has inflated the scope of desirable worker attributes to the point where "the concept of skill becomes essentially meaningless" (Keep and Payne, 2004: 57). One effect of the widespread adoption of such a broad and, some suggest, amorphous concept as generic skills is that it presents potentially insurmountable difficulties for educational institutions charged with teaching these skills to a workforce. This is because there is little common agreement as to their scope and relative importance. In addition, many generic skills lack an objective means of determining degrees of competence for those receiving instruction. Related to this last point, it has been suggested that some 'generic skills' are an abstraction that have little direct applicability to particular conditions in particular workplaces. Proponents of the idea of generic skills, such as problem solving, regard them as being 'context/domain independent'. On the contrary, it has been argued that "the ability to solve any given problem, above and beyond the most simple, relies on expertise and specialist bodies of knowledge" (Keep and Payne, 2004: 58). Finally, the widespread adoption in policy circles and by industry of the concept of generic skills may have the unintended adverse consequence of undermining workforce innovation capacity. The abstract and non-occupationally specific nature of generic skills implies that they can be readily acquired through formal education courses outside the workplace. Indeed, there are incentives for employers to shift the cost burden of such training onto government by having generic skills delivered in public education and training institutions. Such training could be integrated into existing educational and training courses or conducted separately. These developments have been opposed on several grounds.

PART 2.
THEMATIC ISSUES IN DEPTH ANALYSIS

PART 2. THEMATIC ISSUES IN DEPTH ANALYSIS

2. PROVISION OF AND ACCESS TO TRAINING TO SUPPORT INNOVATION: THE ROLE OF SOCIAL PARTNERS AND COLLECTIVE BARGAINING

"To foster workplaces as spaces for lifelong learning, reengineering and revitalizing workplace learning is key. Workplaces across sectors, including for the self-employed and those working in the informal economy, are potentially important learning environments, even more so if enterprises become learning organizations. Workplace learning is a crucial driver for lifelong learning and becomes increasingly important, considering the ongoing transformation of the nature of work and the changes taking place in the labour market." (Unesco, 2020). Technological change, globalisation and population ageing are affecting how we work, what we do and what jobs are available to us. We can also expect that climate change, global warming and the transition towards a low-carbon economy will have an impact on the world of work. OECD research finds that 46% of workers are at risk of either losing their job or seeing it change significantly because of automation over the next two decades (Nedelkoska and Quintini, 2018). In advanced economies, workers will likely need more complex skillsets for jobs that focus on combinations of tasks that cannot be offshored or automated easily. They will also retire later than previous generations. At the same time, new organisational business models have led to the emergence of new forms of work, such as independent food delivery drivers who receive their orders via an online platform. These new forms of work deviate from the standard permanent, full-time and dependent employment that are a reference for our social security systems. This has sparked a debate about access to training programmes, social protection and collective bargaining for workers in new forms of work (Global Deal, 2020).

For individuals, firms and economies to benefit from these changes, well-functioning adult learning systems that prepare us for the new world of work are needed (Cedefop, 2020). Adult learning makes workers adaptable and allows them to keep abreast with the skill needs of the labour market. In turn, a skilled workforce enables firms to develop and introduce new technologies and work practices, therewith boosting productivity and growth in the economy (Brunello and Wruuck, 2020): collective bargaining and social dialogue can help address the challenges posed by a changing world of work. As demographic and technological changes unfold, collective bargaining can allow companies to adjust wages, working time, work organisation and tasks to new needs in a flexible and pragmatic manner. It can help to shape new rights and provisions, adapt existing ones, regulate the use of new technologies, provide active support to workers transitioning to new jobs and anticipate skills needs. (OECD, 2019a).

The strategic framework for European cooperation in education and training adopted in May 2009 sets a number of benchmarks to be achieved by 2020 [21], including one for adult participation in learning, namely that an average of at least 15 % of adults aged 25 to 64 years old should participate in lifelong learning. The European Pillar of Social Rights Action Plan (adopted in 2021) has set a new target whereby at least 60% of all adults should participate in training every year by 2030 [22]. In 2019, the proportion of persons aged 25 to 64 in the EU who participated in education or training was 10.8 %; a share that was 3 percentage points higher than the corresponding share for 2011. Denmark, Finland and Sweden stood out from the other EU Member States as they reported considerably higher proportions of their respective adult populations participating in lifelong learning in the four weeks preceding the interview carried out by the Eurostat agency (Table 2). Broadly, it can be seen that countries with strong social partnership have higher levels of participation in life-long learning. By contrast, among the countries covered by the present report Romania and Bulgaria, reported adult learning rates of 2.0 % or less [23].

21 See, Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training ('ET 2020') (2009/C 119/02)
22 See, The European Pillar of Social Rights: turning principles into actions
23 For further information see Table 2.

The proportion of the population who had participated in adult learning was higher among women (11.9 % in 2019) in the EU than among men (9.8 %); the shares for men and women were both higher in 2019 than they had been ten years earlier [24].

Considering the gender perspective in the field of workplace training, policies mitigating discrimination and workplace harassment have become objects of collective bargaining and are now included in sectoral and firm-level collective agreements. For instance, around 30% of collective agreements in the retail and commerce sector in the European Union contain at least one clause on equal access to training, around 40% a clause on equal promotion opportunities, close to 50% a clause on equal pay and close to 80% a clause on non-discrimination (Besamusca, Kahancová and Tijdens, 2018).

In addition to the data from the labour force survey which provides information on participation in education and training in the four weeks preceding the survey interview, information on education and training is available from the adult education survey (AES) [25]. For the EU as a whole, participation rates in education and training in the 12 months preceding the interview were almost the same for men and women. In Cyprus, Czechia, Hungary and Italy, men were considerably more likely than women to have participated in education and training, whereas the reverse was true in Estonia, Finland, Latvia, Sweden and Lithuania.

An analysis by age shows that the participation of younger persons (aged 25–34) in the EU was more than 20 percentage points higher than that of older ones (aged 55–64) in 2016. Participation in education and training among older persons was particularly low in Romania and Greece [26].

Looking at the innovation performances of the European Countries, since 2012, progress has been strongest in Innovation-friendly environment (notably Broadband penetration), firm investments (notably non-R&D innovation expenditures and enterprises providing ICT training), human resources (notably population with completed tertiary education), and attractive research systems (notably International co-publications). By contrast, Public R&D expenditures as a share of GDP remain below their 2012 level (European Commission, 2020b). Both public and private investments are important to increase Europe's innovation potential. The public services provide the necessary infrastructure to support research and innovation, and therefore need to be fostered through long-term investments [27]. Digitalisation and automation can generate new business opportunities through the development of new production processes, new products and new markets. This may drive the demand for new skills in the workplace, which in turn leads to changes in education systems which may have to adapt to technological changes in order to provide students with up-to-date training and education that meets the requirements of prospective employers. Considering the issue of the skills for innovation [28], as for the European Innovation Scoreboard it is possible to state that ICT and STEM skills are particularly important for innovation in an increasingly digital economy. Thus, the share of enterprises providing training in that respect could be accounted as a proxy for the overall skills development of employees. The following table provides an overview of the number of

24 In 2019, women recorded higher participation rates than men in all EU Member States except for Romania, Germany and Luxembourg (where rates for men were higher), while Czechia and Slovakia reported the same rate for both sexes. The largest gender difference, in percentage points, was in Sweden, where the participation rate for women was 16.8 percentage points higher than for men.

25 The AES measures participation in learning activities with a longer reference period (12 months preceding the survey interview) and therefore is likely to cover more learning activities, resulting in higher participation rates in formal and non-formal education and training. However, it is carried out less frequently (from 2016 every six years). The most recent wave of the survey was conducted between July 2016 and March 2017 (and named the 2016 AES). According to this survey, in 2016 44.4 % of people in the EU aged 25 to 64 took part in education and training (during the 12 months preceding the interview), the majority of which participating in non-formal education and training.

26 As for the findings gathered through the online interviews and without wishing to be exhaustive, besides the demographic factor, the following features seems to have and/or are perceived by interviewees to have a detrimental impact on the access to training: be a low-skilled worker, belong to a micro or small company, be employed with a fixed term or part time contract, own low or none formal qualifications. The latter factor is confirmed also by Eurostat data: the likelihood of participation in education and training has resulted to be related to the level of educational achievement: in 2016, persons with a tertiary level education reported the highest participation rates (65.4 % for the EU), while those having completed at most lower secondary education were the least likely to have participated (23.6 %).

27 See, Figure 23 for data about general government expenditure in education and Figure 24 for the R&D intensity in EU, R&D expenditure as % of GDP.

28 For a complete picture of the "skills for innovation" issue see Chapter 2.2 of this report.

enterprises that provided any type of training to develop ICT related skills of their personnel. Overall, in the EU, almost one in four enterprises provided any type of training to develop ICT related skills of their staff (24 %). The highest proportion was observed among medium and large enterprises (European Commission, 2020b)[29].

Considering the providers of non-formal education and training activities, employers were the most common providers of non-formal education and training activities, providing more than one third (33.8 %) of such activities in the EU according to the 2016 adult education survey[30]. Employers provided almost two thirds of non-formal education and training in Bulgaria, and three fifths of such activities in Hungary. Among the less common providers of non-formal education and training in the EU as a whole, the relative importance of non-formal education and training institutions was particularly high in Poland (48.7 %) and Slovenia (36.7 %), formal education institutions were frequent providers in Lithuania and Finland, and commercial institutions (where education and training is not the main activity) in Sweden. Among the countries covered by the report, only Denmark and Estonia reported Trade Unions as providers with rates above 4% against a European average of 1.2 %.

When investigating the access to training in the framework of career paths, in first place, it is worth mentioning that most adult learning takes place at work (European Commission, 2020). With the workplace being of central importance to adult education and training, social dialogue has a key role to play in getting adult learning systems ready for the future (OECD, 2019b). Involving employers as well as trade unions in shaping adult learning policies is essential, because they both hold vital information on what training needs are, where priorities should be set and how best to deliver training accordingly (Ilo, 2020a; Ilo Actrav 2019). This, in turn, may enhance successful implementation of policies through increased acceptance by employees and employers. Hence, bringing in the voices of social partners can help strengthen the adaptability of workers and the adult learning system in general (OECD, 2019a). Moreover, the recent policy brief for the International Labour Organisation (Ilo, 2020b) on the effective governance and coordination in skills systems and lifelong learning ecosystem states *"Agreement at national level across ministries and agencies is essential for successful implementation of well-coordinated skills and lifelong learning strategies. Multi-stakeholder endorsement involving the social partners, is essential to guarantee long term commitment across successive governments and to enable continuous and incremental improvement in a system".*

Secondly, the involvement of social partners in the adult learning system varies strongly across countries. While in some countries social partners are heavily involved in the definition and management of the training system, they have a limited consultative role in others. The figure below (Figure 1) summarises the involvement of the social partners in the governance of the education and training systems of their respective countries. While OECD classifies countries into four broad categories, it is important to keep in mind that the degree of involvement is indeed a continuum.

29 For further information see Table 3.
30 Source: Eurostat (online data code: trng_aes_170).

Table 1: Social partner involvement in governance of education and training systems [31]		
The social partners define and manage the training system	Austria Denmark Germany	Iceland Italy Netherlands
The social partners contribute to the definition of the training system	Belgium Finland France [32] Luxembourg	Norway Poland Slovenia Switzerland
The social partners have a consulting role	Czech Republic Estonia Greece Ireland Latvia	Lithuania Portugal Slovak Republic Spain Sweden [33]
Other	Hungary	United Kingdom

With specific reference to the role which social partners can play in managing and funding training programmes [34], as well as contributing to their design and their evaluation, a particularly interesting case is that of the O&O funds (Opleidings- en Ontwikkelingsfonds) in the Netherlands, which are financed primarily through a compulsory payroll levy fixed by collective agreement (Eurofound 2020). O&O funds provide lifelong learning to workers to keep them "up-to-date" and ready to find new jobs in the future. The funds also promote campaigns on the importance of training, and finance or kick-start projects on the ground. Again, a constant exchange between social partners allows O&O funds to anticipate skill needs. In a time of rapid change, the role of social partners in finding tailor-made solutions, managing transitions, anticipating and filling skills needs may, therefore, be increasingly important. Moreover, Klindt (2017) argues that investing in skills is not only useful to strengthen labour market adaptability and to help workers in case of displacement, but it is also a winning strategy for union renewal. Partnership with employers can be a revitalisation strategy for weak unions to attract new members, but also for more established unions to keep their roots in the local community.

One of the key functions of job-related adult learning is to make sure that people have the skills that are needed in the labour market. Having these skills helps individuals find and keep employment and progress in their career. It also supports employers in developing their business and improves the overall functioning of the labour market (Bakule et al., 2016). However, identifying who needs what kind of training is a challenge. It is difficult to predict what skills will be in demand in the future, and it is hard to establish which of these skills individuals already possess. Social partners have key knowledge on these matters: employers have an idea about what skills they need in order to develop their business and trade unions have information about the skills

31 Author's elaboration on the basis of the results of the OECD Policy Questionnaire: Towards resilient and inclusive collective bargaining systems (OECD, 2016, 2018), and OECD Policy Questionnaire: Readiness of Adult Learning Systems to Address Changing Skills Needs (2018). In several countries (for instance in the Czech Republic, Finland, Luxembourg, Slovenia or the United Kingdom), the social partners also act as direct training providers.

32 The social partners define and manage the training system at the sectoral-level, contribute to the definition of the training system at national/cross-sectoral level and have a consulting role at company-level, sectoral-level and national/cross-sectoral level.

33 For Sweden, the abovementioned OECD classification refers to social partners' role in the public-education system only. Otherwise, looking at different domains (i.e. the social partners' involvement in the Employment Security Councils - collective agreements on transition), Sweden could be included in the first category of countries. The Swedish Job Security Councils (JSCs) are one of the most notable examples where collective bargaining can complement public policies in enhancing labour market security and adaptability: they provide support and guidance to displaced workers, even before displacement occurs, as well as access to training and reskilling opportunities in the case of plant closures and mass layoffs. Source: Engblom, 2017 and online in-depth interviews.

34 The financial incentives for R&D and skills investments are further in-depth investigated under § 4.

and training needs of their members. For example, skills councils[35], also known as sectoral councils or sector skills councils, make use of the valuable information both actors hold. They bring together social partners to anticipate changing skill needs and discuss what adult learning is needed to address those needs (OECD, 2016).

In more detail, and with reference to the involvement of staff representatives/committees in the management of CVET (enterprise level), data from the European Continuing Vocational Training Survey (CVETS) show that the involvement of staff representatives on this topic is generally highest in France (27%), Luxembourg (38.2), Spain (24.7) and the Italy (21.8) and smallest in Estonia (3.8) and Poland (2.9). Moreover, larger companies involve staff representatives more often in setting training objectives than SMEs, although the dispersion varies across countries. In France, 54% of large companies involve staff representatives and 8% of small companies do. In the United Kingdom, on the other hand, the dispersion is much smaller (27% of large companies, compared to 22% of small companies).

Box 1: a focus on recognition and validation of learning outcomes

An issue that has emerged as being of particular relevance in connection with that of provision and access to training is that of the recognition and validation of learning outcomes. Generally speaking, most European countries have skills audits in place, but the service is not always widely accessible to those who might need it the most. Around two thirds of European countries have skills audits in place that are compatible with those defined in EU steering documents. Since 2014, the implementation of skills audits across Europe seems to have increased[36]. While the use of skills audits is currently rather widespread across Europe, they are not always included in standard services for unemployed people or those at risk of unemployment. Moreover, when offered to these groups, skills audit services are not necessarily delivered within a reasonable period of time. In 2016, 3.2 % of adults across the EU reported having received an assessment of skills and competences by means of tests, skills audits or interviews during the previous 12 months. While national regulatory frameworks now commonly cover the validation of non-formal and informal learning, actual validation opportunities and the extent to which they are subject to national monitoring differ greatly across countries. Virtually all European countries now have some arrangements in place for the validation of non-formal and informal learning in the education and training sector. However, the number of education and training areas (sub-sectors) covered by the validation arrangements varies between countries- Across Europe, the validation of non-formal and informal learning leads to different qualification outputs. In some countries, the process can lead to full formal qualifications, while in other countries it is possible to obtain only parts of formal qualifications and/or non-formal certificates. In a limited number of countries, none of the above is possible. Countries with validation arrangements in place do not always monitor different aspects of the process. Those with data on beneficiaries often indicate that at least some categories of learners commonly regarded as 'disadvantaged' (e.g. individuals with low levels of skills or qualifications, early school leavers, jobseekers, older workers, migrants and refugees, and people with disabilities) are among those making greater use of validation in at least one education and training area. In 2016, on average, across the EU, 3.1 % of adults reported having received information or advice on the validation or recognition of skills, competences or prior learning during the previous 12 months.

35 The topic covering the importance of implementing well-functioning skills observatories for anticipation and matching of skills which foresee the involvement of social partners will be analyzed in the Thematic report #2. In general terms, skills councils anticipate skill needs across and within sectors, and translate their sector-specific knowledge into recommendations for education and training. Considering the preliminary findings resulting from the interviews, it is possible to affirm that there are choices to make when setting up skills councils, including which and how many stakeholders should be represented, its legal status, budget allocation, exact tasks and outputs, frequency of meetings and modus of operation. Several initiatives in the field of skills forecasts and foresights will be presented during the implementation of the Project, including, for example, the French Occupation and Skills Observatories (Observatoires Prospectifs des Métiers et des Qualifications: OPMQ) which is an observatory jointly funded by employers' organisations and trade unions.

36 Source: European Commission/EACEA/Eurydice, 2021. Adult education and training in Europe: Building inclusive pathways to skills and qualifications. Eurydice Report. Luxembourg: Publications Office of the European Union.

The policy debate over the last 20 years has been about bringing together all types of learning, and creating the frameworks able to recognise and validate experience and learning achieved in different ways to confer qualifications. The adoption of the Council Recommendation on the validation of non-formal and informal learning of 20 December 2012[37] acknowledges the potentially important role to be played by validation in relation to employment and mobility, as well as for lifelong learning. It is a clear political impulse with the goal of having national validation mechanisms in all countries.

Validation represents a concrete tool to acknowledge non-formal and informal learning. However, the implementation of validation mechanisms varies greatly from one Member State to another and within countries. This is why the EU has launched the Council Recommendation that provides common guiding principles to Member States to develop validation and thus move towards common standards.

The importance to Europe of skilled and knowledgeable citizens extends beyond formal education to learning acquired in non-formal or informal ways. Citizens must be able to demonstrate what they have learned to use this learning in their career and for further education and training.

Countries need to establish systems that allow individuals to identify, document, assess and certify (=validate) all forms of learning to use this learning for advancing their career and for further education and training.

With reference to the involvement of employer organisations or individual employers in validation arrangements, several countries during the interview and online survey phase indicate that employer organisations or individual employers are strongly involved in setting up standards (notably Belgium, Czech Republic, Denmark, France, Malta, Sweden). In the Czech Republic, representatives of employers were among the initiators of the NSK (National Register of Qualifications), the main tool for CVET and validation. Their active involvement in the development of the NSK aims to balance their role in (initial) vocational education, which is considered as not strong enough. Sector Skills Councils that include also employers' representatives contributed to the development of qualification and assessment standards used in validation.

In the area of adult vocational education and training in Denmark, there is a tradition of collaboration between enterprises and formal educational institutions concerning competence development of employees including validation. Large enterprises use validation of prior learning especially in cases of development of companies as well as in the downsizing and closing of enterprises (Cedefop, 2016). In the case of France, a difference should be made i.e. employer organisations are included in different paritarian bodies involving social partners in the design, update and assessment of VET qualifications, which is not the case for individual employers. Employers in Malta have a vested interest in ensuring that there are qualified workers, so sector representatives are mainly involved in setting up occupational standards. Representatives of employers and employer associations are also members of the Sector Skills Units and have an important role to play in helping people to access the labour market and to support their career development. In Sweden, standards developed by different business sector organisations are used as trade specific frameworks for the validation of vocational knowledge, skills and competences. These are mainly occupational standards focusing on an outcome-based evaluation of the extent to which an individual knows a certain occupation or trade, or elements thereof. Different countries indicate that design of national strategies for validation is among the most important validation-related activities of employer organisations and individual employers (Belgium, Denmark, France, Netherlands, Sweden). As for an interviewee from the Confédération syndicale indépendante du Luxembourg "(In Luxembourg) *one issues which should be reinforces is the validation of the experience gained both in formal and informal, non-formal contexts (dossiers de validation pour demonstrer le savoir faire): France could be accounted as a good practice in the field of validation and certification of competencies. However also the French system could be improved*

37 See, Council Recommendation of 20 December 2012 on the validation of non-formal and informal learning <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32012H1222%2801%29>.

since is still quite complicated and non-user friendly. We advocate for a more flexible mechanism". In France, for example, at the national inter-sectoral level, social partners have an essential role in regulatory, policy and financial aspects of lifelong learning programmes (IVET and CVET). They can contribute to shaping the general policy framework on validation, through the adoption of sectoral or inter-sectoral collective agreements, through governance bodies of employment, guidance and vocational training. In general terms, information, advice and guidance provision and awareness raising and promotion of validation are of medium level of importance in terms of employers' involvement in validation. In France, sectoral bipartite organisations in charge of vocational training and the OPCA (bipartite training funds), as well as individual employers, promote the use of validation for workers, including through the development of so-called collective VAE (groups of workers undertaking individual validation procedures).

With reference to the involvement of trade unions in validation arrangements, as for a recent Cedefop thematic report (2019) [38], the border between medium and most important validation-related activities in which trade unions are involved is not clear-cut. For example, the provision of information, advice and guidance is considered among the most important validation aspects in Spain, France, the Netherlands, Portugal, Sweden whereas it is perceived as being of medium importance. Similarly, the case of awareness raising and promotion of validation where four Member States indicate it as one of the most important validation-related activities of trade unions (Malta, the Netherlands, Portugal, Sweden), another three consider it of medium level of importance (Denmark, Spain, France).

In countries where validation is mostly led by the public administration (e.g. Spain, Portugal), trade unions (and also other labour market-related stakeholders) participate mostly at implementation level. In Spain, trade unions and business organisations can promote official announcements (calls for application) for particular sectors to evaluate competencies acquired through experience; however, this happens rarely in practice. In countries with a long tradition in the establishment of collective agreements between social stakeholders (such as Denmark, France, the Netherlands and Sweden) trade unions are more strongly involved in the design of national strategies for validation.

Incentives at national, regional and local level are proven to have a positive effect on the involvement of social partners and other labour market related stakeholders in validation. In Belgium, there are financial incentives (such as paid educational leave: it is the right of workers from the private sector to follow recognised courses and to be absent from work while retaining their wages. The employer cannot refuse but must agree to the schedule of the leave). After training, the employer can seek reimbursement from the government by filing a claim. For the certification of skills, the worker can get a maximum of eight hours per year, but only the day of the exam counts (i.e. only the working hours for the exam can be reimbursed to the employer in this case). Financial incentives with the aim of motivating an increased use of validation in adult vocational education have been implemented also in the Danish context. Validation has been developed in Denmark from both a top-down approach and a bottom-up approach. The legislation and the formal framework have been set nationally, but the implementation is decentralised at the provider level. Financial constraints still pose obstacles to implementation and great differences still remain between the educational institutions with regards to their level of activity. However, the tripartite agreement for Adult Vocational Education and CVET (2018-2021) include financial incentives for both education providers (in terms of a raised taximeter) and for enterprises (in terms of a higher wage compensation to employers) to remove former financial constraints for more participation in Adult VET , which has been declining since 2010. Regional services of the Ministry of Labour in France manage, finance or co-finance - with regional councils, professional branches, OPCA or Pôle Emploi - schemes or projects aiming at collective validation des acquis de l'experience i.e. groups of workers undertaking individual VAE procedures. Collective VAE can target several qualifications, either in one company

38 M. Dzhengozova (2019), European inventory on validation of non-formal and informal learning 2018 update. Thematic report: How social partners (chambers of industry and commerce, trade unions) and other labour market-related stakeholders are involved in validation arrangements, Work carried out under DG EMPL Implementing Framework Contract EAC/47/2014-3: VC 2017/0692.

(for instance to secure pathways of vulnerable employees, with the support of the State) or in one given territory. In the Netherlands, many SMEs are supported in the application of validation of prior learning by sectoral training funds. The A+O Fonds Gemeenten (Training fund for city-workers) offer a good example of such a sector-steered model. The costs for obtaining an Ervaringscertificaat (certificate of experience) in the sector vary from € 700 to € 1500. Part of these costs are tax-deductible for the employer; on top of this the Fund covers an amount of € 1000 per employee when validation of prior learning s part of a career-guided trajectory, providing that the employee has not been involved in a similar trajectory in the last three years. In CZ and SE, more resources (personnel, but also financial) were allocated for validation arrangements, for example, through the integration of validation in ALMPs to support unemployed people and/or disadvantaged groups, and at the same time, to address labour market needs. For instance, the Czech PES adopted the national policy of validation of non-formal and informal learning represented by the National Register of Qualifications - NSK, and has been linking retraining offers to existing vocational qualifications. This provides registered unemployed people with the opportunity to gain a nationally recognised qualification, with the related fees covered (if approved) by the PES. The incentive for the PES relates to reducing unemployment through providing retraining (upskilling) possibilities for registered unemployed people. The Swedish PES (in collaboration with the different social partners) focuses on developing more effective actions for newly arrived immigrants with education and skills tools in areas with strong demand in the labour market. For example, a digital tool (Jobskills.se) for self-assessment and documentation of skills and competences for asylum seekers and newly arrived immigrants was launched in 2017. The tool is aimed to help asylum seekers to get in contact with employers during the time they wait for a decision on a residence permit. The incentive for employers is to respond to eventual skills shortages in given areas. At regional level, the Qualifica Centres in Portugal, which are located in diverse types of institutions (public schools, training centres, companies, local and regional associations), establish protocols with companies and other institutions to motivate and mobilise adults to increase their qualifications as well as to develop Recognition, Validation and Certification of Competences processes in the work context. The incentive for employers (to get involved in regional partnerships) relates to ensuring a skilled workforce and improved economic development of the region.

Alongside the theme of the recognition and validation of learning processes, the research has identified in the updating of job profiles and curricula a further trace to be explored in order to better understand the interplay between skills needs and innovation processes. In this regard, qualification standards appear to be a powerful coordination mechanism for improving the match between demand and provision of education, training and learning. Qualification standards are the result of interactions between the worlds of work (embodied by social partners, professional associations, employments services, etc.) and of education (training providers, teachers, awarding bodies, education ministries, etc.). This interaction can be described as a feedback-loop, with different users of qualifications communicating either directly in the process of defining standards, or indirectly through the collection of information on employer expectations and the publication of learning requirements. The form taken by the feedback-loop in each country differs, but common challenges and trends can be identified. Qualification standards, defined as norms and specifications regulating the award of qualifications, take various forms depending on the countries or the education segment.

These standards, with their systematic occupation descriptions, are expected to simplify keeping qualifications up to date and relevant to the needs of the labour market while providing information to learners on the job profile targeted by the qualification. Educational standards should be distinguished from occupational standards because they follow a pedagogical logic, of progressive accumulation of knowledge and skills, and not the logic of a systematic description of occupational tasks, functions and associated competences. The variety of educational standards across Europe is as important as it is for occupational standards. Differences can be noted in the objects of standardisation (duration of study programmes, contents of teaching, teaching methods, etc.) and the degree of detail, with countries granting varying autonomy to local authorities, training providers and teachers to design and undertake curricula and learning programmes. Qualifications are situated at the interface between the worlds of work and of education: they are awarded as the result of a learning process to be used on the labour market. Accordingly, the award of a qualification can be based on regulation of the learning process or on labour market requirements. In most countries, qualification

standards address both aspects. Comparison of qualification standards across Europe further reveals a general shift towards the use of outcome-based standards, independent from the type (occupational or educational) qualifications are based on. Learning outcomes are generally seen as facilitating the link between employment and education; they are formulated in terms of competences, a concept shared by both systems. In addition, learning outcomes have an important role to play in international mobility (credit systems and qualification framework) as well as lifelong learning and validation of various learning experience. The use of work analysis methods and the involvement of stakeholders in defining standards are crucial elements of a well-functioning feedback-loop to ensure the relevance of qualification standards to the needs of employers and other users. Social partners are increasingly involved in developing national qualification standards across Europe. Participation is institutionalized even in countries with weak traditions of social partnership and attention is paid to a balanced representation of both employers and employees. Whereas patterns of involvement may differ greatly depending on national contexts and traditions, some common challenges can be identified. The lack of capacity of employers to articulate their expectations and needs, especially in emerging professions, is a first challenge faced particularly by countries with weak social partners. Even where social partners have a long tradition of self-organisation and involvement, institutional arrangements must be carefully designed to provide the participation opportunities for structurally weak actors such as SMEs and for professions not fitting into traditional sector categories.

2.1. General EU overview | Facts and figures

Table 2: Adult participation in learning (2010, 2019 and 2020) [39]

	2010	2019	2020
Denmark	32,7	25,3	20,0
Switzerland	29,7b	32,3	27,6
Iceland	25,4	22,2	20,3 b
Sweden	24,7	34,3	28,6
Finland	23,0	29,0	27,3
United Kingdom	20,1	14,8	:
Norway	18,2	19,3	16,4
Netherlands	17,0	19,5	18,8
Slovenia	16,4	11,2	8,4
Austria	13,8	14,7	11,7
Luxembourg	13,5	19,1	16,3
Spain	11,2	10,6	11,0
Estonia	11,0	20,2	17,1
Cyprus	8,1	5,9	4,7
European Union - 27 countries (from 2020)	7,8	10,8	9,2
Czechia	7,8	8,1	5,5
Germany	7,8 b	8,2	7,7 bp
Belgium	7,4	8,2	7,4
Ireland	7,1	12,6	11,0
Italy	6,2	8,1	7,2
Malta	6,2	11,9	11,0
Portugal	5,7	10,5	10,0
Latvia	5,4	7,4	6,6
Poland	5, 2b	4,8	3,7
France	5,0	19,5	13,0
Lithuania	4,4	7,0	7,2
Greece	3,3	3,9	4,1
Slovakia	3,1	3,6	2,8
Croatia	3,0	3,5	3,2
Hungary	3,0	5,8	5,1
Turkey	2,9	5,7	5,8
Bulgaria	1,6 b	2,0	1,6
Romania	1,4 b	1,3	1,0

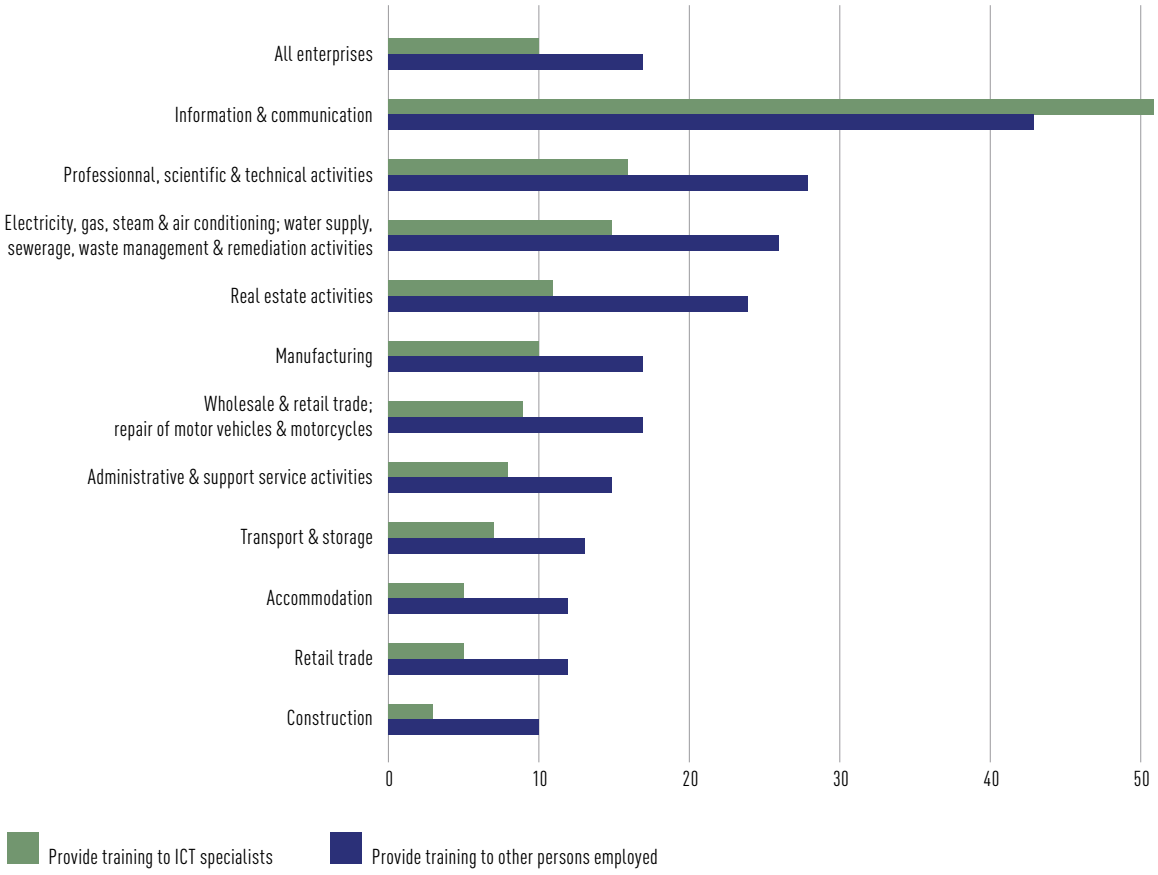
Special value
: not available

Available flags:
b break in time series

Source: Eurostat (TRNG_LFSE_01)

39 The adult learning indicator refers to the percentage of the population aged 25 to 64 participating in formal and non-formal education and training and the reference period for the participation is the four weeks preceding the interview as is usual in the labour force survey.

Figure 1: Enterprises that provided ICT related training to their persons employed, by economic activity, EU, 2019 (% enterprises)



Source: Eurostat (isoc_ske_ittn2)

Table 3: Enterprises that provided training to develop/upgrade ICT skills of their personnel, by size class, EU, 2019 (% enterprises)

	All enterprises, without financial sector (10 persons employed or more))	Small enterprises (10-49 persons employed), without financial sector	Medium enterprises (50-249 persons employed), without financial sector	Large enterprises (250 persons employed or more), without financial sector
EU - 27 countries (from 2020)	23	19	41	70
EU - 28 countries (2013-2020)	24	19	42	70
Belgium	36	31	57	85
Bulgaria	10	8	16	40
Czechia	25	17	46	78
Denmark	31	25	49	79
Germany	32	25	54	81
Estonia	17	13	33	62
Ireland	31	27	45	77
Greece	15	13	29	61
Spain	22	18	36	63
France	21	18	37	68
Croatia	23	18	41	62
Italy	19	17	36	61
Cyprus	31	27	47	65
Latvia	18	14	30	58
Lithuania	11	8	17	53
Luxembourg	27	22	45	68
Hungary	16	13	29	67
Malta	26	22	43	61
Netherlands	:	:	:	:
Austria	18	14	36	72
Poland	13	9	26	65
Portugal	28	25	:	71
Romania	6	5	10	30
Slovenia	28	23	46	81
Slovakia	18	12	34	63
Finland	37	31	59	88
Sweden	32	27	58	80
United Kingdom	29	24	52	73
Iceland	:	:	:	:
Norway	44	41	60	80

Source: Eurostat (isoc_ske_ittn2)

Table 4: Participants in CVET courses by type of CVET agreement and size class, EU, % of persons employed in all enterprises (2005, 2010, 2015) [40]

	2005	2010	2015	2005	2010	2015	2005	2010	2015
	From 10 to 49 persons employed			From 50 to 249 persons employed			250 persons employed or more		
U - 28 countries (2013-2020)	5,6	9,8	10,7	15,8	15,2	16	33,3	31,9	33,1
Belgium	3,6	13,1	18,5	28,5	30,5	39,1	53,9	42,3	42,3
Bulgaria	1,5	2,2	2,9	3,8	8,1	6,6	15,4	30,3	16,1
Czechia	2,8	6,8	8,1 b	17	10,3	11,9 b	48,4	20	25,8 b
Denmark	12,4	20,8	3,6	18,3	23,7	8,6	32,5	30,2	26,2
Germany (until 1990 former territory of the FRG)	3,5	2,7	4,5	13,7	9,6	7,4	26,2	34,8	33,1
Estonia	4,5	2,5	2,1	12,1	5,7	4	22,9	9,8	11,2
Ireland	:	:	11,3	:	:	14,3	:	:	29,1
Greece	1	1,7	2	1,6	4,8	6,9	16,6	12	23,2
Spain	7,6	18	18,8	22,8	28,9	33,5	48,2	54	59,5
France	10,6	26,7	27,4	35,6	41,9	40,8	57,3	55,6	62,3
Croatia	:	2,9	1,8	:	3,2	3,5	:	9,9	8,8
Italy	4,2	6	8,8	11,7	12,7	19,1	39,8	40	46,3
Cyprus	4,7	12,1	3,3	13,8	22,8	13,2	33,2	48,3	21,4
Latvia	0,6	1	0,3	2	1,8	1,5	11,4	10,3	6,4
Lithuania	0,9	1,8	1,6	2,7	4,4	4,3	9,8	10,8	13,8
Luxembourg	17,2	14,3	14,5	37,3	23,1	41,3	67,4	46,9	67,6
Hungary	0,6	4,3	2,4	4,1	8	5	18,5	23,9	21
Malta	1,3	2,8	5	7	15,6	14,4	30,6	32,6	26,1
Netherlands	5,2	10,2	13	20,8	20,7	24,4	42,1	36,6	36,7
Austria	2,7	8,4	8,6	19,5	12,9	13,4	39,9	23,1	28,2
Poland	0,6	0,5	0,7	2,4	1,9	1,6	14,9	6,9	8
Portugal	3,5	6	3,7	10,2	10,5	8,9	30,3	12,7	29,9
Romania	2,1	1,3	1,1	5,2	3,7	3,9	18,9	15	11,4
Slovenia	2,2	8,9	9,1	4,6	18,2	17,7	20,6	33,2	34,9
Slovakia	6	4,4	9,1	15,3	7,7	15,4	46,7	15,4	22,5
Finland	5,6	6,5	10	21	12,5	19	43,3	26,7	31,6
Sweden	9,2 u	14,5	: bu	23,7 u	19	: bu	43,3 u	31,9	: bu
United Kingdom	8,5	9,5	12,2	11,4	8,1	15,3	21,4	16,1	20,1
Norway	19,1 u	27,8	25,7	32,2 u	32	30,3	31,5 u	39,6	47,7

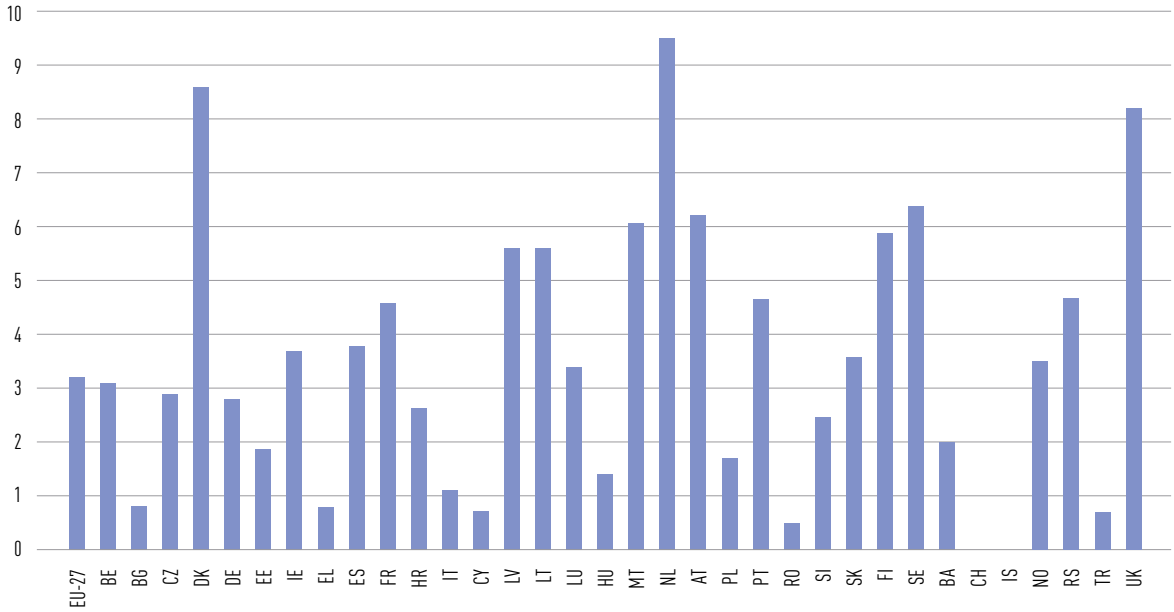
Special value
: not available

Available flags:
bu: break in time series, low reliability
b break in time series

Source: Eurostat (trng_cvt_15s)

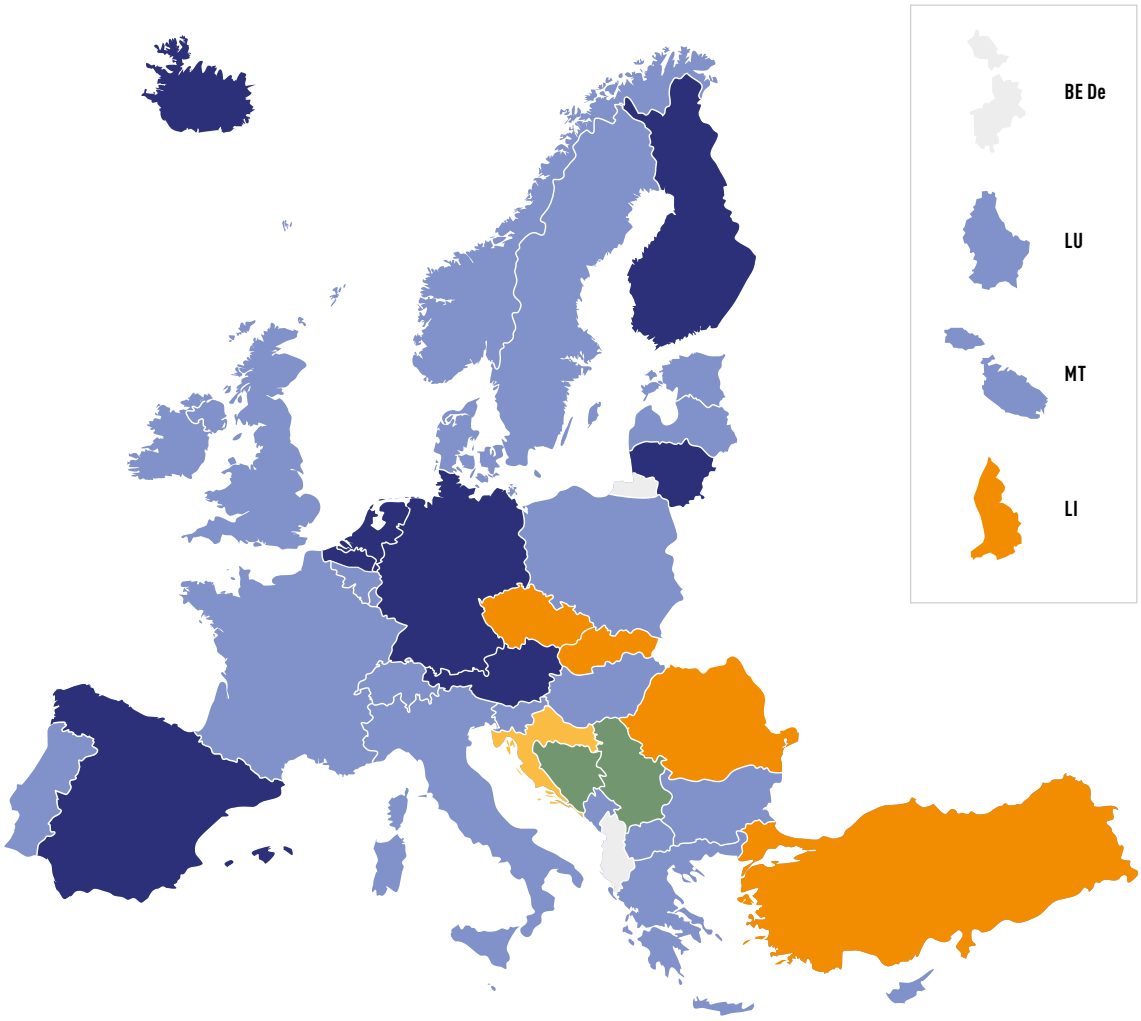
40 Collective agreement between social partners on CVET or involvement of staff representatives/committees in the management of CVET (at enterprise level).

Figure 2: Adults (aged 25–64) who received a free assessment of skills and competences by means of tests, skills audits or interviews in the 12 months prior to the survey (%) (2016=



Source: Eurostat (AES)

Figure 3: Overview of the implementation of validation arrangements in education and training (2018)



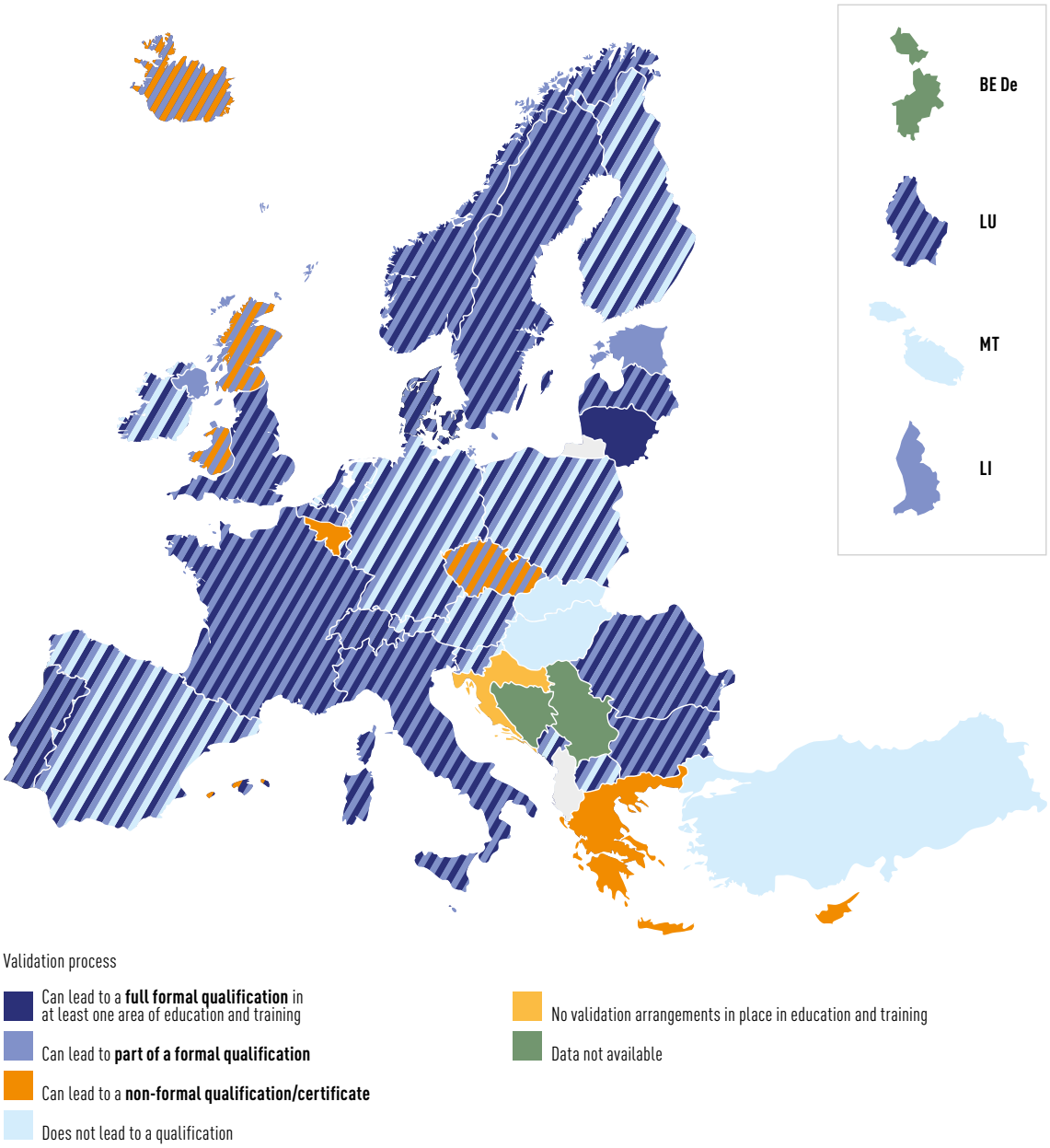
Validation arrangements are in place

- In **all areas** of education and training (i.e. GE, IVET, HE, CVET, AE)
- In **at least three (but not all) areas** of education and training
- In **fewer than three areas** of education and training
- Validation arrangements are not in place in education and training
- Data not available

Source: European Commission, EACEA, Eurydice (2021), Adult education and training in Europe: Building inclusive pathways to skills and qualifications, Luxembourg: Publications Office of the European Union, p. 120[41]

41 This figure is based on data published in the synthesis report of the 2018 update of the European inventory on validation of nonformal and informal learning (Cedefop, European Commission and ICF 2019, pp. 53-55). The questionnaire that was used to collect data for the inventory referred to five areas of education and training: general education (GE), initial vocational education and training (IVET), continuing vocational education and training (CVET), adult education (AE) and higher education (HE). IVET, CVET and AE were defined using the 2014 Cedefop glossary of education and training policy (Cedefop, 2014). GE was defined as general compulsory and upper secondary education. The questionnaire acknowledged that, while some areas are reasonably clearly defined (e.g. HE), the interpretation of other areas (e.g. CVET and AE) can differ between countries and also within a country. Thus, the number of areas per country should be interpreted with caution.

Figure 4: Qualifications as an output of the validation of non-formal and informal learning (2018)



Source: European Commission, EACEA, Eurydice (2021), Adult education and training in Europe: Building inclusive pathways to skills and qualifications, Luxembourg: Publications Office of the European Union, p. 121 [42]

42 This figure is based on data published in the 2018 update of the European inventory on validation of non-formal and informal learning (Cedefop, European Commission and ICF (2019), Op. Cit., pp. 16-17).

2.2. A spotlight on target countries | best and less successful practices

The present section, focusing on the six project target countries, presents a collection of cases based on desk research and in-depth interview results and where relevant via the online survey (which findings will be discussed in detail in section 2.4 below).

The following examples should be interpreted as an overview of the selected best practices/examples of less successful practices at a country, sectoral and enterprise level. The cases, which encompass also the findings gathered via the online survey, have been grouped under four main thematic domains which have emerged as recurrent topics of discussion.

JOINT PRIORITIES AND STAKEHOLDERS' COOPERATION IN ADULT LEARNING STRATEGIES

Adult learning encompasses many varied learning opportunities compared to other areas of education. It includes provision as diverse as literacy courses for adults who are struggling to read or write; second-chance education courses for people who dropped-out of school before getting a qualification; work-based training for workers who need to get to know new technology; and short specialized courses to help unemployed people back into employment. Consequently, the many actors involved in adult learning typically do not perceive themselves as being part of a cohesive 'adult learning system'. Rather, they are part of fragmented sub-systems, each with their own objectives, target groups, financing mechanisms and governance structures (Desjardins, 2017). Adult learning strategies can provide an overarching framework for all actors. To ensure everyone's buy-in, the strategies must be developed jointly by key actors of the adult learning system. Joint priorities for adult learning can also be established at company level, for example through involving staff representatives in setting the objectives of training.

[Estonia] Some processes for developing adult learning strategies build on earlier cooperation between stakeholders. In 2013/2014, the Estonian Ministry of Education and Research, the Estonian Education Forum and the Estonian Cooperation Assembly (including representatives from trade unions, employer organisations and civil society) developed the Estonian lifelong learning strategy. The involved stakeholders had cooperated previously in the development of the Estonian education strategy 2012-2020. The strategy sets five strategic goals for lifelong learning: i) change towards an individual approach to learning; ii) competent and motivated teachers and school leadership; iii) alignment of learning opportunities with labour market needs; iv) digital focus in lifelong learning; v) equal opportunities and increased participation. To monitor the implementation of the strategy, quantitative key indicators were set and an implementation plan was developed (Ministry of Education and Research, 2014). All the stakeholders and social partners were actively involved in the development of the new lifelong learning strategies and the work continues on sectorial and horizontal programmes. In addition to the work on strategy, the following specific initiative was launched in 2013 aiming at promoting partnerships with stakeholders, civil society, and social partners in general education. "Huvitav Kool" (Interesting School) initiative integrates three important elements of high-quality general education into a single framework (European Commission, 2020).

[France] Deployed since January 15, 2021, Collective Transitions makes it possible to anticipate the economic changes of the company by supporting volunteer employees towards a serene, prepared and assumed reconversion. Co-built with social partners, the "Collective Transitions or TRANSCO" is a vocational retraining scheme set up by the State. It seeks to support companies in difficulty and to preserve the employment of their employees. It is aimed to identify the promising occupations in each territory, as well as the threatened ones. By framing the retraining paths, the State seeks to avoid economic layoffs, on the one hand and train employees in new trades and key skills, on the other hand. It could also be seen as a tool for facilitating professional mobility. Following the closed applications at the end of December 2020, the call for expressions of interest received about 100 responses, 42 of which were from territories with an industrial vocation. Launched at the end of the second social dialogue conference, the call for expressions of interest (AMI) made it possible to identify territorial platforms for professional transitions which could in particular support the deployment of the "Collective Transitions" system. The carriers of these platforms are very diverse (professional branches, social partners, local authorities, skills operators, companies, etc.) and the proposed partnership is very rich (employment center, local authorities, operators of professional development advice, consular chambers, companies...) Testifying

to the shared interest in the organization of professional transitions in the regions. The platforms should make it possible to facilitate the creation of links between businesses that create jobs and businesses with weakened jobs at the scale of a territory. The platforms could also act a place for consultation and coordination because they make it possible to articulate the various tools carried by the State or by institutional actors aiming to support the economic changes of companies and employees in a territory. These projects show a dynamic partnership and a desire to "do together" within the territories. Half of them are targeted on "Industry Territories" with a vocation to cover sectors other than industry. This presentation of projects does not include a qualitative analysis of expressions of interest or classification. All the projects presented will be supported by the services of the ministry, either by the Organisation de la délégation générale à l'emploi et à la formation professionnelle (DGEFP) or by the Directions régionales des entreprises, de la concurrence, de la consommation, du travail et de l'emploi (DIRECCT)(Online survey and Ministère du Travail, de l'Emploi et de l'Insertion).

COLLECTIVE AGREEMENTS AND ADULT LEARNING

With the increasing importance of adult learning, the importance of explicitly including training and lifelong learning in collective agreements increases as well. Indeed, in many countries, collective agreements have started addressing issues related to the future of work and their implications for the organisation of work as well as the quality of the working environment (OECD, 2019b). From the interviews it emerged that in the majority of cases making long-term commitments and agreements with respect to adult learning can increase each partner's ownership in providing adult learning opportunities. Moreover, agreements on training rights and duties send a strong message about the value of lifelong learning. Thus, collective agreements can ensure effective access to training for workers and help to motivate people to actively seek training. Collective agreements in the area of adult learning can be a good way to ensure that employer (organisations) and trade unions constructively work together on this topic [43].

Collective agreements between employers and unions govern the pay and working conditions of one-in-three workers in the OECD (OECD, 2018). However, the share of employees covered by collective agreements is declining in many OECD countries. Collective agreements with respect to adult learning primarily determine training leave arrangements, employment protection during or after training, and training rights and duties for personal or public health and safety reasons (OECD, 2018).

[Italy] Collective agreements may require mutual concessions. In 2016, after a long-standing dispute, the four-year collective agreement for the Italian metalworkers industry (CCNL Metalmeccanici) was renewed for the years 2016-2019. Unions and employers agreed on a new right to training, in exchange for a limited wage increase. On top of the already existing right for employees to request up to 150 hours of training per person over three years, employers now have to provide a training budget of up to EUR 300 per employee and 24 (additional) hours of paid leave for vocational training. The new training rights only apply to permanent workers in companies covered by the agreement. (Global Deal, 2020). In February 2021 the main Italian trade unions (FIOM-CGIL, FIM-CISL, UILM) and their employers' organisations counterparts (Federmeccanica and Assistal) signed a new draft agreement for the metalworking sector which maintains the provisions concerning the right to continuous training also broadening the beneficiaries of this right (namely to employees under fixed-term contracts under certain circumstances - i.e. minimum duration of the contract-).

[Sweden] Social partners' involvement in the Employment Security Councils - collective agreements on transition). The Swedish Job Security Councils (JSCs) are one of the most notable examples where collective bargaining can complement public policies in enhancing labour market security and adaptability: they provide support and guidance to displaced workers, even before displacement occurs, as well as access to training and reskilling opportunities in the case of plant closures and mass layoffs (Engblom, 2017).

43 Figures show that the share of workers covered by collective bargaining varies strongly between countries. Moreover, not every country with high coverage has collective agreements that cover training. In Austria, for example, close to all wage earners with the right to bargaining are covered by collective agreements (98%), yet only 15% of firms are covered by agreements that concern training. By contrast, collective bargaining coverage is equally high in France (98%), and four in five firms (79%) have agreements that cover training. Source: Eurostat CVETS data (2010, 2015), OECD.stat Collective bargaining coverage.

EMPLOYER LEVIES TO FINANCE ADULT LEARNING

Employers benefit from job-related learning activities, because they increase productivity and employee retention, and they can improve engagement as well as management-worker interactions (OECD, 2017). Yet, some employers are reluctant to invest in training out of concern that they might not see any return on their investment, e.g. when workers change jobs. Other reasons for low training investments may be a lack of information, capacity and/or resources. This is especially true for small and medium-sized enterprises. To incentivise training investment, many countries use training levies. These not only ensure that employers pay their fair share for adult learning, but the financial contribution can also encourage employers to put greater emphasis on upgrading the skills of their workforce and make them more competitive (Dar, Canagarajah and Murphy, 2003). Moreover, the levies can be used to redistribute money from firms who train very little to firms who spend most on training. Nevertheless, the effectiveness of levies depends on their design and the feasibility and desirability of implementing them must be carefully evaluated. There are three types of training levies [44], each with their specific pros and cons. Implementing a levy scheme requires decisions regarding the size of the levy, exemptions and sectoral coverage. Moreover, decisions need to be made about who manages the training funds. See how others implement the different types of levy schemes in practice:

[Italy] Some levy-grant schemes are managed in social partner collaboration, such as the intersectoral training funds (fondi interprofessionali) in Italy. These funds are financed through employer contributions, equal to 0.3% of the wage bill, which covers the costs of local, sectoral, company and individual training plans. Since the early 2000s, employers' organisations and trade unions can decide to set up joint funds that manage the spending of training levies in the industrial, agricultural, services or artisanal production sector. Employers who want to run training projects must apply to the relevant training fund, where a technical team evaluates the application, including whether it takes into consideration the priorities established by the fund. Nowadays, the funds play a major role in the national continuing training system, and it has become possible to use the funds for fixed-term and temporary workers as well as apprentices (OECD, 2019a).

TRAINING PROVISION: EVALUATION AND QUALITY ASSURANCE

PIAAC data show that most adults learn to advance their career. More than 50% of adults who took part in job-related training, did so to do their job better, to improve their possibilities of getting a job or to reduce the risk of losing their job. Yet, not all training helps them achieve this goal. Data from a different survey, the European Adult Education Survey (AES), shows that one in three adults who participate in training do not think it helped them achieve positive employment outcomes. Information on the outcomes of training participation is one important indicator of the quality of training. Yet, at a programme or provider level, such information is scarce. Also for the majority of the respondents interviewed for this Project, efforts to collect such information should be strengthened to ensure the quality of adult education and training effectively. Social partners have a key role to play in this context, as discussions about quality always contain value judgements about what adult learning is trying to achieve. Including social partners in this process ensures that their views are appropriately represented [45].

44 The three major types of training levy schemes are i) revenue-generating schemes, also called revenue-raising schemes, ii) levy-grant schemes, also known as levy-rebate schemes, and iii) levy-exemption or train-or-pay schemes. However, in practice, countries often have hybrid schemes. Source: OECD, (2017); Dar, Canagarajah and Murphy, (2003).
45 The self-reported usefulness of participation in training varies between countries. In Hungary (87%), Slovenia (82%) and Italy (82%) more than four in five learners report positive outcomes. In the Netherlands (35%) and Turkey (49%), less than half of learners state that they have experienced positive employment outcomes following training participation. It is important to note that these data both reflect the effectiveness of training and labour market conditions and other contextual factors. Note: Refers to non-formal job-related learning only, positive employment outcomes are defined as getting a (new) job, higher salary/wages, promotion in the job, new task, better performance in the present job; % of participants. Source: Eurostat AES data (2016).

Social partners can be involved in quality assurance at different levels, be this through providing oversight on boards of education providers, being part of local or sectoral quality assurance bodies or having representation on national agencies responsible for the quality assurance of adult learning.

[Sweden] In some countries, social partners have a role in agencies that ensure the quality of (parts of) the adult learning system: the Swedish National Agency for Higher Vocational Education (Myndigheten för yrkeshögskolan) ensures the quality of higher vocational education programmes. Both trade unions and employers are represented on the agency's advisory council for labour market issues. The role of the advisory council includes the inspections of providers and programmes, including work-based training elements. The inspections entail observational visits, interviews with students, tutors, teachers and head coordinators. Based on the inspection, as well as an assessment of labour market needs, the council advises the National Agency about which training programmes should receive state grants and be included in the higher vocational education offer (Kuczera, 2013).

[Germany] Many countries have complex multi-level quality assurance systems, which are supported by social partners. In Germany, certification of trainings in the context of active labour market policies is conducted by certifying bodies (Zertifizierungsstelle). One of the better-known certifying bodies, CERTQUA, is run by the leading German employer organisations[46] (German Economic Institute, 2018). Certifying bodies, in turn, need to be accredited by the German Federal Public Employment Agency (Bundesagentur für Arbeit). An advisory council supports the agency in this work. Trade unions and employer organisations are part of the council (Cedefop, 2012). This system does not cover other sub-systems of the adult learning system.

[Estonia] The Education Strategy 2021-2035 sets out a detailed list of indicators for achieving the national strategic goals in the field of education. One of the actions foreseen by the Strategy under "Goal 3" concerns the development and implementation of a sustainable system of forecasting and monitoring skills needs which takes into account the needs of all target groups and of coordinating actions between different actors in order to promote the acquisition of knowledge and abilities that serve the labour market and to better link education to the labour market and for this end it is also necessary to "agree on clear roles and responsibilities of social partners that enable them to actively and meaningfully participate in linking education to labour market needs" (Education Strategy 2021-2035).

2.3. What does the survey say?

This section provides a preliminary overview of the online survey's results concerning the topic investigated in the present report and corresponding to questions Q1-Q25[47].

In the first place, the respondents were asked to rate the importance of a set of skills to promote the innovation process (both in general terms and with reference to the industry the operate in) and to provide their opinions about the availability of these skills in their countries, sectors and companies. In addition, respondents were asked to autonomously elaborate and provide examples of skills considered strategic to innovation[48]. The table below illustrates the feedback received.

46 Confederation of German Employer's Associations, Associations of German Chambers of Commerce and Industry, German Confederation of Skilled Crafts.
47 Q1-Q5: Section 1 – General information about the respondent; Q6-Q26: Section 2 – Provision of and access to training to support innovation. The role of social partners and collective bargaining.
48 Open-ended non-compulsory question.

Table 5: Skills to promote innovation (perceived importance rate)		
Skills	**Rating (1: not important at all – 5 extremely important)**	**Skills Imbalances (nr. of preferences expressed)** [49]
Soft & Transversal Skills	4.26	"These skills are difficult to find": 32 "These skills are available, on average": 24 "I don't' know": 4 "These skills are fully available": 3
Sector or Job-Related Technical Skills	4.48	
Basic Level Digital, ICT & E-Skills	4.35	
Advanced Level Digital, ICT & E-Skills	3.73	
Language Skills	3.75	
Green Transition and Climate Related Skills	3.87	
Entrepreneurial Skills	3.68	

Skills strategic for innovation (country/sector breakdown) [50]	
Country/Sector	**Skills**
Belgium/Manufacturing (4 respondents)	communication; empathy – openminded; thinking out of the box – creativity; initiative – skills for digitalization; skills for green transition [51].
Belgium/Professional, scientific and technical activities (2 respondents)	scientific and academic knowledge
Bulgaria/Cross sectoral organization (1 respondent)	creativity, problem solving, critical and systemic thinking, analysis
Bulgaria/Administrative and support service activities (1 respondent)	job related technical skills
Croatia/Cross sectoral organization (1 respondent)	digital; ICT skills; green - climate skills
Cyprus/Professional, scientific and technical activities (1 respondent)	digital; entrepreneurial skills
Czech Republic/Cross sectoral organization (2 respondents)	creativity; agility – risk taking; problem solving
Czech Republic/Manufacturing (1respondent)	machine operator; engineering skills
European level/Construction (1 respondent)	ability to translate *skills* into added value in the field; basic environmental and technological knowledge
European level/Other service activities (1 respondent)	basic digital skills; basic language skills (especially for migrant workers).
European level/Agriculture, forestry and fishing (1 respondent)	creativity; ability to learn new things
France/Manufacturing (2 respondents)	digital; environmental skills - adaptability (for example, how to be ready to integrate the impact of digital and automation in your daily tasks); how to learn to work well together remotely
France/Administrative and support service activities (1 respondent)	linguistic skills; basic digital skills
France/Cross sectoral organization (1 respondent)	Sector or job-related technical skills; advanced level digital, ICT and e-skills
Germany/Cross sectoral organization (3 respondent)	Strategic thinking; risk management and courage – Digital skills and sector/job-related technical skills; entrepreneurial skills – digital; climate related skills

49 Mismatches between the skills offered and those required on the national/sectoral/company level job market. No. 1 invalid feedback. Single answer question.
50 No. 6 invalid and incomplete feedback.
51 Each pair of skills corresponds to an individual feedback.

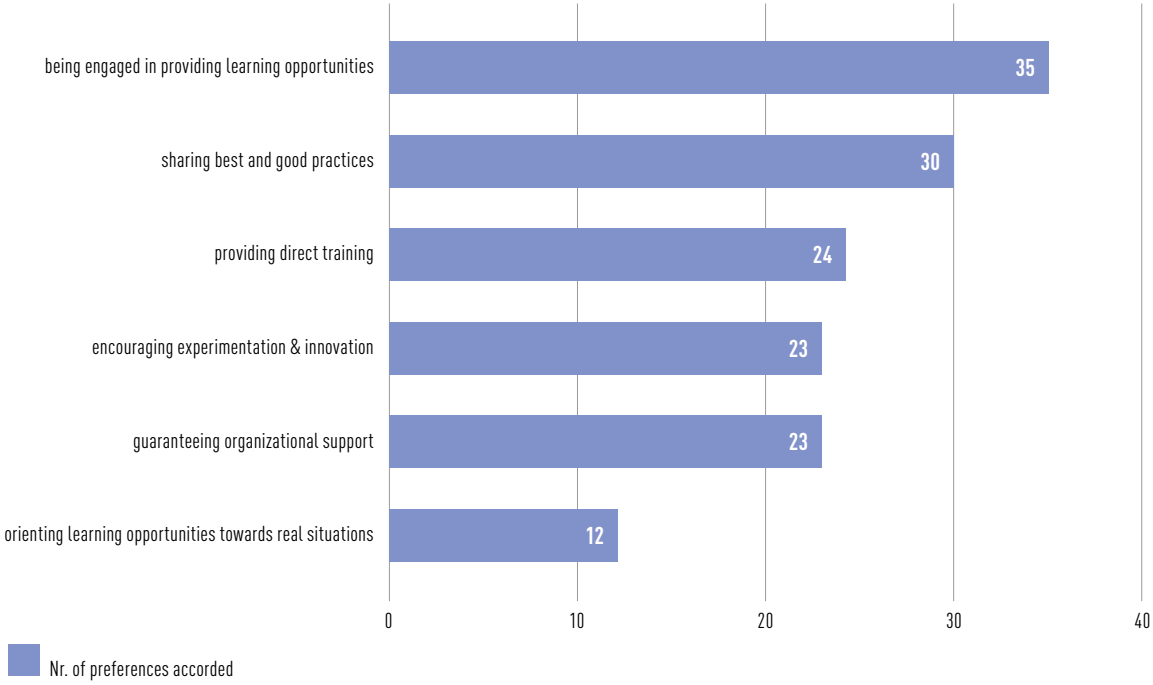
Country/Sector	Skills
Germany/Manufacturing (2 respondents)	process skills (the holistic mastery of all interlinked sub-processes in an overall process. It includes all the necessary qualifications for processing a concrete operational order) as well as transfer skills (ability to successfully transfer what has been learned in one situation to another situation and to actively use this experience – coding; big data use
Germany/Information and communication (1 respondent)	critical thinking; problem solving
Greece/Cross sectoral organization (2 respondents)	thinking out of the box; understanding of the way digital technologies can transform the company – Advanced level Digital, ICT & e-skills, Entrepreneurial Skills
Italy/Electricity, gas and steam and air conditioning (1 respondent)	computer skills; work organization skills
Italy/Cross sectoral organization (5 respondents)	teamwork; creativity – technical; digital skills for new industrial processes – digital; soft skills (2) - digitization, sustainable; ethical development of companies
Luxembourg/Cross sectoral organization (1 respondent)	identify and solve problems; communication, teamwork; initiative and creativity
Montenegro/Cross sectoral organization (1 respondent)	ICT; green jobs skills
Netherlands/Cross sectoral organization (1 respondent)	green transition skills, soft transversal skills
Netherlands/Manufacturing (1 respondent)	ICT skills; flexibility
Netherlands/Electricity, gas and steam and air conditioning (1 respondent)	willingness to change; see opportunities
Spain/Cross sectoral organization (9 respondents)	teamwork; positive attitude – entrepreneurial; digital skills – creativity; critical thinking; digital skills; entrepreneurial skills; critical thinking; knowledge of sustainable processes; consensus diagnosis of needs; public-private financing; ability to recognize opportunities and threats; adaptability – creativity; sector-related skills – initiative; lifelong learning skills -
Spain/Construction (1 respondent)	OSH relates skills; environmental skills
Spain/Human health and social work activities (1 respondent)	leadership; teamwork
Spain/Professional, scientific and technical activities (1 respondent)	resilience (adaptation to change) and multidisciplinary
Spain/ Manufacturing (1 respondent)	initiative
Sweden/Manufacturing (1 respondent)	process skills; IT skills
Sweden/Cross sectoral organization (1 respondent)	digital; green transition skills

Workplace training resulted to be extremely important to develop such skills [52].

Subsequently, respondents were asked about the type of involvement of their organisations in creating a learning culture and training strategies which make employees aware of, and motivated to engage in training. The following figure provides an overview of respondents' feedback.

52 4.6 out of 5 average score. Minimum value: 3 This option was selected by No. three respondents: one belonging to an Italian national-level trade union active in the electricity, gas, steam and air conditioning sector, one Belgian national level employers' organisation and one company level employers' representative operating in the manufacturing sector.

Figure 5: Type of involvement of organisations in creating a learning culture and training strategies to motivate employees in engaging in training



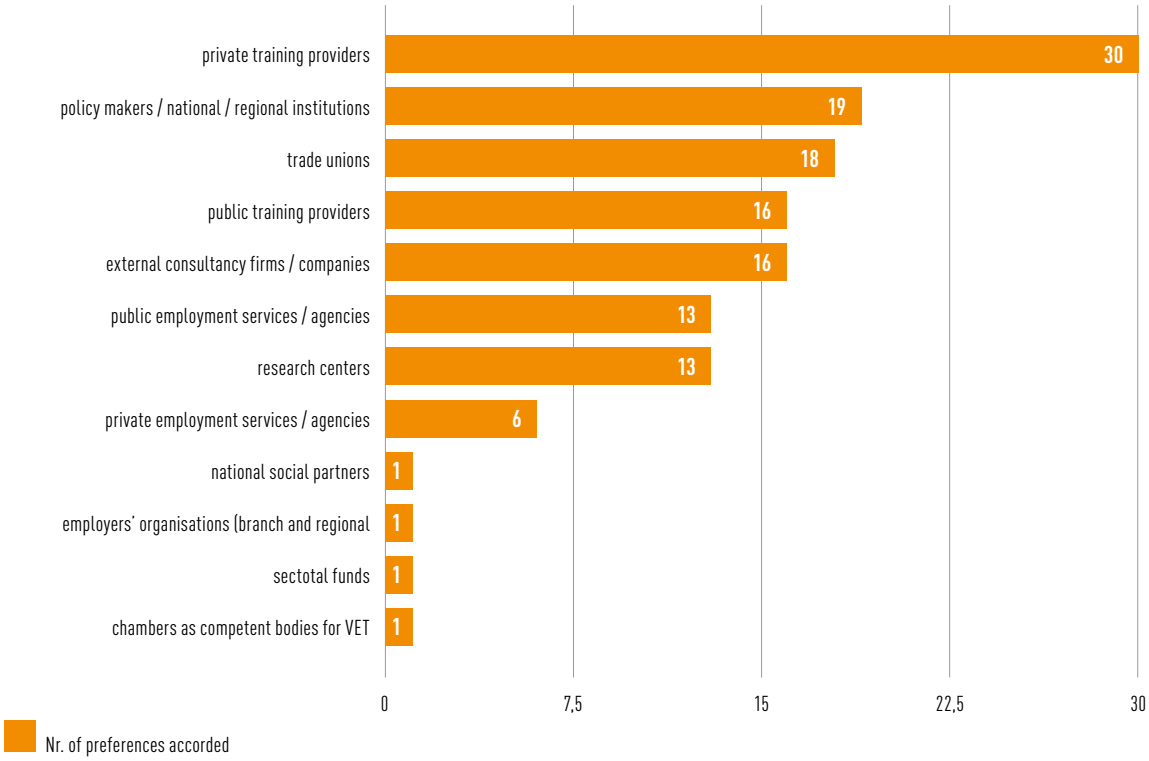
Other respondents indicated "sectoral training funds" (Belgian respondent – National level trade union representative) and "As recognized social partner for our sector we are involved in industry relevant training issues in many different forms (institutionalized role, project partner, services for our members etc.)" (German national level employers' organisation affiliated respondent) and "by guaranteeing a win-win situation for employees" (Luxembourg, Chambre des salaries respondent) by autonomously filling out the available space for additional options under the field "Other" [53].

Overall, National/Regional policies of ministries of education/skills agencies resulted to be perceived as supportive in innovation and employee training for companies and workers [54]. However, not only the policies on innovation and training are only sometimes [55] negotiated with national and sectoral social partners, but also respondents declared to be only partially satisfied with these negotiations [56].

The role played by social dialogue, collective bargaining and other forms of joint initiatives in supporting innovation has been rated, on average, as important [57] and 40 out of 64 respondents declared that their organisation has been directly involved in training provision to support the innovation process. Questioned on eventual other actors involved in the training provision, respondents provided their feedback as for the following graph:

53 Multiple-choice question.
54 3.07 out of 5 average score (1: not supportive at all; 5: extremely supportive). No. 1 incomplete feedback. Minimum value: 1 selected by a national-level Belgian trade union representative.
55 3.1out of 5 average score (1: never; 5: always). No. 1 incomplete feedback.
56 2.6 out of 5 average score (1: not satisfied at all; 5: satisfied). No. 1 incomplete feedback.
57 4 out of 5 average score (1: not important at all; 5: extremely important). No. 1 incomplete feedback.

Figure 6: Actors involved in training provision



Among the reasons of respondents' organisations for not being directly involved in training provision to support the innovation processes the option "lack of resources (human and/or financial)" received the largest number of selections (20), followed by "lack of time" (5). In four cases training provision initiatives have been considered not pivotal for supporting innovation processes[58]. In addition, the survey included a question concerning the eventual partnership in which respondents' organisation are involved to facilitate the training provision. Where respondents declared to be involved in (48 cases), such partnerships usually involve universities/research centers (26 feedback) and local vocational training providers (18 feedback)[59].

"Workers can contribute to enhancing enterprise/national/sectoral innovation performances". The vast majority of the interview sample were in agreement with this sentence, selecting respectively "strongly agree" and "agree" in 37 and 24 cases. Only 3 interviewees neither agree nor disagree with the statement[60].

The following table (Table 6) provides a complete overview of the issue concerning who is in charge of defining the conditions for access to training (at national-sectoral and company level) and respondents' satisfaction level concerning the provision of and access to training in terms of meeting changing needs of employers and workers[61].

58 This option has been selected by four national level trade union representatives from Greece, Sweden, Belgium and France. It should be highlighted that in case of umbrella organisation the direct provision of training is in charge of organisation's members and/or carried out at sectoral level.
59 Other partnerships could include: national public authorities and sectoral training funds.
60 Belgium, national level trade union representatives (No. 2 feedback); Sweden national level trade union representative (No. 1 feedback).
61 Single answer question.

Table 6: Who's in charge of defining the conditions for access to training? – Average level of satisfaction (country level)

	Affiliation	Conditions for access to training are defined by:	Level of satisfaction	Average level of satisfaction (country level)
Belgium	A Trade Union	social partners are informally involved (i.e. consultancy role)	Unsatisfied	Neutral (50%)
	A Trade Union	it is organised through social dialogue arrangements	Neutral	
	A Trade Union	it is organised through social dialogue arrangements	Neutral	
	A Trade Union	it is organised through social dialogue arrangements	Unsatisfied	
	An Employers' Organisation	it is organised through social dialogue arrangements	Neutral	
	An Employers' Organisation	it is organised through social dialogue arrangements	Very Satisfied	
	An Enterprise	social partners are involved in terms of financing training	Satisfied	
	An Enterprise/workers' representative	social partners are informally involved (i.e. consultancy role)	Neutral	
Bulgaria	A Trade Union	social partners are informally involved (i.e. consultancy role)	Satisfied	Satisfied (100%)
	An Employers' Organisation	it is organised through social dialogue arrangements	Satisfied	
Croatia	An Employers' Organisation	social partners are informally involved (i.e. consultancy role)	Unsatisfied	Unsatisfied (100%)
Cyprus	An Employers' Organisation	National Agencies	Satisfied	Satisfied (100%)
Czech Republic	A Trade Union	social partners are informally involved (i.e. consultancy role)	Unsatisfied	Unsatisfied (67%)
	A Trade Union	National Agencies	Unsatisfied	
Czech Republic	An Employers' Organisation	is a Central Government/Regional/Local Authorities prerogative	Neutral	
Denmark	An Employers' Organisation	it is organised through social dialogue arrangements	Satisfied	Satisfied (100%)
Estonia	A Trade Union	social partners are informally involved (i.e. consultancy role)	Neutral	Neutral (100%)
EU	An Employers' Organisation	Mix of the above	Unsatisfied	Unsatisfied (67%)
	An Employers' Organisation	social partners are involved in terms of financing training	Unsatisfied	
	An Employers' Organisation	social partners are involved in terms of financing training	Neutral	
France	A Trade Union	it is organised through social dialogue arrangements	Neutral	Neutral (100%)
	An Employers' Organisation	social partners are involved in terms of financing training	Neutral	
France (word format)	An Employers' Organisation	social partners are involved in terms of financing training	Neutral	
France	An Enterprise/empl	National Agencies	Neutral	

	Affiliation	Conditions for access to training are defined by:	Level of satisfaction	Average level of satisfaction (country level)
Germany	An Employers' Organisation	it is organised through social dialogue arrangements	Satisfied	Satisfied (83,3%)
	An Employers' Organisation	employers are responsible for initial training/apprenticeship and further training of their staff further training	Satisfied	
	An Employers' Organisation	social partners are involved in terms of financing training	Satisfied	
	An Employers' Organisation	Social partners and central government and regional authorities are working close together	Satisfied	
	An Enterprise/empl	it is organised through social dialogue arrangements	Satisfied	
	An Enterprise/empl	it is organised through social dialogue arrangements	Unsatisfied	
Greece	An Employers' Organisation	social partners are informally involved (i.e. consultancy role)	Neutral	Neutral (100%)
Greece (word format)	An Employers' Organisation	is a Central Government/Regional/Local Authorities prerogative	Neutral	
Italy	A Trade Union	it is organised through social dialogue arrangements	Unsatisfied	Unsatisfied - Neutral (43%)
	A Trade Union	social partners are involved in terms of financing training	Neutral	
	A Trade Union	it is organised through social dialogue arrangements	Unsatisfied	
	A Trade Union	social partners are involved in terms of financing training	Neutral	
	An Employers' Organisation	it is organised through social dialogue arrangements; social partners are involved in terms of financing training	Neutral	
	An Employers' Organisation	is a Central Government/Regional/Local Authorities prerogative	Unsatisfied	
	An Employers' Organisation	social partners are involved in terms of financing training	Satisfied	
Luxembourg	(*) chambre professionnelle salariale	it is organised through social dialogue arrangements	Satisfied	Satisfied (100%)
Montenegro	A Trade Union	social partners are informally involved (i.e. consultancy role)	Neutral	Neutral (100%)
Netherlands	A Trade Union	it is organised through social dialogue arrangements	Neutral	Neutral - Unsatisfied - Satisfied (33,3%)
	An Enterprise/empl	social partners are informally involved (i.e. consultancy role)	Unsatisfied	

	Affiliation	Conditions for access to training are defined by:	Level of satisfaction	Average level of satisfaction (country level)
Spain	A Trade Union	social partners are involved in terms of financing training	Neutral	Unsatisfied (50%)
	A Trade Union	it is organised through social dialogue arrangements	Neutral	
	A Trade Union	social partners are informally involved (i.e. consultancy role)	Unsatisfied	
	A Trade Union	it is organised through social dialogue arrangements	Unsatisfied	
	A Trade Union	social partners are informally involved (i.e. consultancy role)	Unsatisfied	
	A Trade Union	is a Central Government/Regional/Local Authorities prerogative	Very Unsatisfied	
	A Trade Union	social partners are involved in terms of financing training	Unsatisfied	
	A Trade Union	social partners are informally involved (i.e. consultancy role)	Unsatisfied	
	An Employers' Organisation	it is organised through social dialogue arrangements	Unsatisfied	
	An Employers' Organisation	social partners are informally involved (i.e. consultancy role)	Neutral	
	(*) An Employers' Organisation	is a Central Government/Regional/Local Authorities prerogative	Neutral	
	An Enterprise/workers' representative	it is organised through social dialogue arrangements	Satisfied	
	An Enterprise	it is organised through social dialogue arrangements	Satisfied	
Spain (Asturie)	A Trade Union	is a Central Government/Regional/Local Authorities prerogative	Unsatisfied	
Sweden	A Trade Union	Shared responsibility among social partners and central government	Satisfied	Neutral - Satisfied (50%)
	A Trade Union	is a Central Government/Regional/Local Authorities prerogative	Neutral	
N/a	An Enterprise/empl	is a Central Government/Regional/Local Authorities prerogative	Neutral	
N/a	An Enterprise/empl	For company: by management	Neutral	
N/a	An Enterprise/empl	social partners are informally involved (i.e. consultancy role)	Very Satisfied	
N/a (word format)	An Enterprise/empl	—	—	

3. GAME CHANGING TECHNOLOGIES AND INNOVATIVE APPROACHES TO THE IDENTIFICATION OF NEW SKILLS

"In a context of dynamic and complex labour markets, gathering intelligence on current and future skill needs can support better matching of training and jobs, which is of paramount importance for every country" (ETF,CEDEFOP,ILO, 2016a, p.5). In recent years, better understanding of labour market needs and skills matching have featured high on the policy agenda of many countries, driven by both rapid technological advances and global competition. The European Union (EU) places great emphasis on skills anticipation and better matching. The Europe 2020 strategy and, in particular, the recent New Skills Agenda, recognises that anticipation and matching approaches and methods can help develop a skilled workforce with the right matrix of skills in response to labour market needs, in a way that promotes job quality and lifelong learning. The EU Skills Panorama, launched in 2012, supports the effort to provide better data and intelligence on skill needs in the labour market. Mismatches between the skills offered and those required on the job market continue to be high on the policy agenda. Digitalization and technological disruptions are changing skills demand very fast, turning the task of identifying skills needs into the pursuit of a fast-moving target that is hard, if not impossible, to hit. At the same time, uncertainty and disruption raise the bar of expectation in predicting the skills required by the jobs of the future even higher (FRANCE STRATEGIE, 2021). The traditional methods of skills needs anticipation and matching involve reliance on either quantitative analysis or qualitative research. Quantitative approaches typically use proxies for the measurement of skills, such as occupations, qualifications and levels or types of education (i.e. skills forecasts). Such proxies provide useful information but could be not sufficiently informative about the specific skills and competencies needed on the labour market and "without this extra level of information, skills remain hard to pin down in policy-making" (ILO, 2020, p.1). Qualitative approaches (i.e. foresight exercises) certainly fit the purpose better, allowing to identify specific skills and competency needs at regional or sectoral level, or for specific occupations and qualifications.

However, they are fairly time-consuming and require significant resources (ETF,CEDEFOP,ILO, 2016a); also, given the speed at which labour markets are changing, they run the risk of producing information that is obsolete before it can be used. This is why researchers and policy-makers are looking for other sources of information that will help to address the problem more efficiently. With reference to innovative approaches to the identification of skills, it is worth mentioning the recent research carried out by the International Labour Organisation which addresses the need expressed by policy-makers for other sources of information that will help to address the problem more efficiently: big data and online job posting. The increasing use of the Internet for publishing job vacancies offers an incredibly rich source of data. Namely, it allows to access in real time information on current skills demand, captured through job descriptions. Since the information is already there, its use is also efficient in terms of cost. However, the data from this source lacks structure, suffers from duplications and lack of representativeness, needs cleaning and quality checking, and is subject to many other potential problems, including data privacy issues that stand in the way of its effective use. An additional limitation is a limited reach of online vacancies due to poor connectivity and a large share of informal jobs. Employers may also want to control the distribution of advertisements online, for example by not having them automatically published on the EURES job portal via national public employment services. Nevertheless, online job vacancies and other types of big data analytics have great potential to contribute to a better understanding of labour markets, especially if complemented by more traditional sources of information (ILO, 2020). Finally, and in accordance with the results of the interview phase, it should be highlighted that there are many different ways to assess the scale and nature of changing skills demand. Skills supply also has several facets. Analysis of skills demand and supply and possible mismatches can take many different forms. For example, sectoral approaches encompass a range of different tools and methodologies, both quantitative and qualitative[62]. Emphasis

62 The term sector is used here to define specific areas of economic activity, the subdivisions used for analysis and classification in an economic system. A sectoral approach to such matters is defined as one which looks at changing skills needs from the perspective of a particular sector.

is often on the latter. Sectoral approaches to skills anticipation are an important part of the involvement of social partners[63], notably with reference to sectoral training funds. A clear message that emerged during the qualitative research phase (survey and interviews), is that "sector matters": to understand the key drivers of change in skills demand, it is critical to have a sectoral focus and perspective. The sectoral level lies at the heart of most approaches to skills anticipation and matching (see Chapter 2). Understanding technologies and markets at the detailed sectoral level and involving representatives of employers and workers at that level is crucial. Different sectors have very different skills needs because of the different economic activities they pursue and the technologies associated with them. It is essential to have a sectoral focus and perspective (ETF ,CEDEFOP, ILO, 2016B). Before presenting a selection of national cases and illustrating the survey results, it is appropriate to further investigate both the issue of the category of skill considered critical for innovation and the technological adoption topic. Finally general data about ongoing skills imbalances in the six target countries are presented. In addition to the increased demand for technical, job-specific skills, the changing nature of work demands skill sets that improve the adaptability of workers, allowing them to transfer easily from one job to another (transversal skills). The OECD outlines that the right skill mix of workers would include: strong general cognitive skills, like literacy and numeracy – which can provide a solid foundation for pursuing lifelong learning – and the ability to 'learn to learn'; analytical skills and a range of complementary skills, like creativity, critical thinking and problem-solving; basic ICT skills; and interpersonal and communication skills, as well as emotional skills like self-awareness and the ability to manage stress and change (OECD, 2017). Moreover, the ongoing transitions are likely to contribute to the so-called polarisation of the labour market (M. Goos, A. Manning, A. Salomons, 2014; D.H. Autor, D. Dorn, 2013). Several studies conducted on the impact of these megatrends on the labour market conclude that the consequent job creation/job destruction increases the demand for highly skilled workers at the same time as the demand for routine job-specific skills declines, thus contributing to job polarisation. As the OECD points out, "middle-skilled jobs have been the most prone to automation and offshoring, due to their highly routine nature, which makes them relatively easy to codify into a set of instructions that could either be carried out by a machine or by a worker abroad" (OECD, 2019). In its Skills forecast for 2030, Cedefop confirms this trend of skills polarisation. In the next ten years, it expects significant growth in employment for high-skill occupations (managers, professionals and associate professionals), some growth for less-skilled jobs (eg, sales, security, cleaning, catering and caring occupations) and job losses in medium-skill occupations, such as skilled manual workers (especially in agriculture), and for clerks[64] (CEDEFOP, 2018). As a consequence, in addition to the need to prepare an adequate supply of high-skilled workers to occupy high-skilled jobs, it will also be relevant to upskill low-qualified adults towards medium-skilled jobs as well as to foster horizontal transitions (ie, from one medium-skilled job to another medium-skilled job). This may be particularly relevant for older low-qualified (least likely to participate in lifelong learning) or medium-qualified workers, where education preparing for high-skilled jobs may not be fully feasible, nor fully justified in economic terms (L. NEDELKOSKA, G. QUINTINI, 2018). As pointed out by many authors and institutions, skill shortages represent an impediment to investment for the great majority of European businesses and could hamper their competitiveness in the medium and longterm (EUROFOUND, CEDEFOP 2020). The strategic skills to be developed should, therefore, be related to specific current and future

63 With reference to the categories of TVET stakeholders involved in the identification of new qualification and competences (NQC) it is worth mentioning the results from the recent online survey carried out by the UNESCO-UNEVOC International Centre: "according to participants, TVET national bodies (97%), public TVET schools and training centres (87%), ministries or local public authorities (87%), and large enterprises (78%) present high levels of involvement in the identification of NQC. Social partners, including chambers of commerce (80%), employer associations (74%) and trade unions (67%) were also regarded as having a relevant influence. On the other hand, participants suggested that youth organizations (32%) and other associations (36%) present lower levels of involvement in the identification of NQC. These results show that well-established and highly organized or connected stakeholders have a major impact on the identification of NQC in different systems". In addition, In a second step, participants were asked to give their opinion of which actors should be more involved in the identification of NQC than they currently are. "A significant number believes that NGOs, civil society organization and other associations (84%) and youth organizations (76%) should be more involved. In both cases, there is more than a 40% gap between the perceived participation of these actors in the identification of NQC and the demand for a higher degree of their involvement. Furthermore, more than 50% of participants believe that individual specialists, universities/research institutions, and small and medium-size enterprises (SMEs) should have greater opportunities to participate in the identification of NQC". It is thus possible to say that BILT survey results suggest a need for European TVET systems to actively promote the involvement of specific stakeholders in order to better identify not only labour market needs but also the expectations and demands that emerge from society in general and young people including TVET learners. Source: UNESCO-UNEVOC International Centre (2020), Trends in New Qualifications and Competencies for TVET Perspectives of the European UNEVOC Network, Bonn, Germany.

64 Even though the demand for jobs in high and low-skilled occupations is expected to grow at a faster pace than in medium-skilled occupations, new workers will still be needed in these medium-skilled occupations to replace those who leave or retire.

in-demand occupations, especially those linked to the green and the digital transitions promoted by the EU's new growth strategy. The topic of skills, knowledge and innovation has generated a vast body of research over the last four decades across several discrete disciplines including innovation studies, sociology, economics, economic history, psychology and education. More recently it has also attracted increased interest from public policy makers. As for an OECD study devoted to the interplay between skills and innovation "a key finding of this study is that overall the evidence supports a strong causal inter-relation between the supply of higher levels of education, training and skills and increased demand for and supply of technical and organisational innovation" (OECD, 2011). At the most fundamental level it has been shown that investment in capital equipment, innovation and employee training are broadly complementary and mutually reinforcing. Indeed, while digitalisation has intensified, and with it the needs for digital skills [65], individuals in many Member States still do not possess basic digital skills.

It is also extremely important for the EU to deliver on its commitment to develop a European competence framework on green competences to guide member states and training providers to adapt and create high quality curricula in the fields of climate change, environmental issues, clean energy transition, sustainable development, etc. (European Commission, 2020a) [66]. Developing lasting partnerships between providers of education and training, including VET providers, and employers, as well as improving training providers' capacity to deliver green-oriented training for developing 'green skills' is indispensable for an efficient transition to climate neutrality [67]. In addition to the two main priority growth areas of green and digital skills, there are also many other strategic fields that would be relevant in the labour markets of today and tomorrow, for instance skills in social economy entrepreneurship (Social Economy Europe, 2020) and in the care economy (European Commission, 2020b). Importantly, critical skills also fully encompass transversal skills, which are essential to ensuring the required adaptability and flexibility of workers throughout the changes in European economies and in the nature of jobs.

As highlighted by the European Political Strategy Centre "In the collaborative work culture and economy of the future, having broader analytical skills and knowledge, and being able to learn fast by linking up different perspectives from different disciplines, appears more relevant than ever" (Epsc, 2016). In addition, transversal skills are not only useful in people's professional lives, but also in their personal development. Fostering their development is thus not only economically sound, but it also has the capacity to help people better themselves personally and ultimately foster social cohesion. The promotion of transversal skills is already reflected at European level in the Key Competences Framework for Lifelong Learning (Council recommendation, 2016) In addition, full advantage should also be taken of the strategic framework for the recognition of transversal skills that is to be put forward by the European Commission in order to support the validation of these skills European Commission, 2020b). Today, regardless of their size, EU companies are already facing some skills shortages. Some sectors are, however, affected more than others. For instance, according to the European Commission, more than 50% of the companies that recruited or tried to recruit ICT specialists in 2018 reported difficulties in filling vacancies (Eurostat, 2020). Not only is this lack of skilled workers one of the main concerns of European businesses, but it also constitutes an impediment to investment for 77% of them (Eurochambres, 2019). In particular, the lack of labour equipped with STEM skills (Science, Technology, Engineering and Mathematics) is a key obstacle to economic growth, as STEM skills are crucial for fostering innovation and driving the digital and green transitions. The upskilling and reskilling of the European labour force is, therefore, not only needed from a social perspective (to retrain displaced workers and/or workers suffering from skills obsolescence) but also for economic reasons (to tackle the skills shortages that hamper the performance and competitiveness of firms in EU countries). Indeed, if the labour force is not upskilled and reskilled, it could "create a bottle-neck for future growth" (Eurochambres, Op cit, p.7).

Moving to the technological adoption issue, the past three years (since 2018) have seen a clear acceleration in the adoption of new technologies among the companies surveyed by the World Economic Forum. Figure 11 presents a selection of technologies

65 For a more detailed description of the usage of digital skills as a proxy for assessing innovation performances see Part 2, 2.
66 "The transition to green economies will potentially create 24 million jobs by 2030, while 1.2 billion current jobs will also be affected in terms of the skills needed." Source: ILO (2018), World Employment and Social Outlook 2018: Greening with Jobs.
67 R. FLAKE ET AL., (2018), Op. Cit.

organized according to companies' likelihood to adopt them by 2025. *"Cloud computing, big data and e-commerce remain high priorities, following a trend established in previous years. However, there has also been a significant rise in interest in encryption, reflecting the new vulnerabilities of our digital age, and a significant increase in the number of firms expecting to adopt nonhumanoid robots and artificial intelligence, with both technologies slowly becoming a mainstay of work across industries"* (WEF, 2020, p. 27).

Moreover, just prior to the COVID-19 pandemic, the DESI Index[68] data on the integration of digital technologies by businesses showed large variations depending on the enterprise size, sector and also countries. Digital technologies enable businesses to gain competitive advantage, improve their services and products and expand their markets. Digital transformation of businesses opens up new opportunities and boosts the development of new and trustworthy technologies. This dimension measures the digitisation of businesses and e-commerce (European Commission, 2020c).

Enterprises were becoming more and more digitised, with large companies taking the lead. 38.5% of large companies relied already on advanced cloud services and 32.7% were using big data analytics. However, the vast majority of SMEs reported that they were not yet using these technologies, with only 17% of them using cloud services and only 12% big data analytics. The highest-ranked countries, with regard to these indicators, are Malta with 24% of companies using big data and Finland with 50% relying on cloud services. As for e-commerce, only 17.5% of SMEs sold products online in 2019, following a very slight increase of 1.4 percentage points compared to 2016. In contrast, 39% of large enterprises made use of online sales in 2019. The top EU performers in the digitisation of businesses are Ireland, Finland, Belgium and the Netherlands (Figure 12).

In more detail, the Digital Intensity Index (DII) developed for informing the DESI Index, measures the use of different digital technologies at enterprise level[69]. Figure 13 presents the composition of the DII in 2019. It also shows the degree of penetration and speed of adoption of the different technologies monitored by the DII. Large companies are more digitised than SMEs. While some aspects seem to be reaching saturation, at least for large companies, for most aspects there is still room for improvement. With reference to the adoption of digital technologies by enterprises, it is evident that large enterprises adopt new technologies more often. Electronic information sharing through enterprise resource planning (ERP) software is much more common in large enterprises (78%) than in SMEs (33%). SMEs (32%) use customer relationship management (CRM) systems to analyse information about clients for marketing purposes less than large enterprises (62%). In contrast, large enterprises (78%) and SMEs (52%) are active on social media. SMEs exploit e-commerce opportunities to a limited extent, as only 18% sell online (versus 39% of large enterprises) and only 8% sell cross-border online (23% for large enterprises). There are many other technological opportunities yet to be exploited by SMEs such as cloud services and big data.

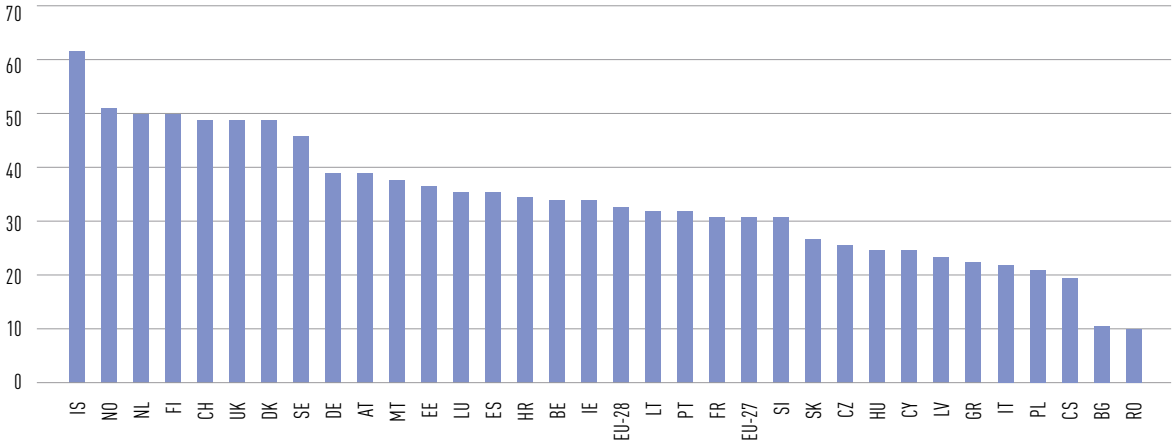
Enterprises all over the EU are constantly adapting to new technologies for collecting, storing and analysing data. In 2018, 12% of companies used big data for analysing large volumes of data. This helped them to produce near time or real time results from data that come in different format types. Large companies have the lion's share in big data processing (with 33% of them using big data), while SMEs have still room for improvement to take advantage of all the benefits of big data (12% use big data). In Malta, almost a quarter of enterprises use big data. The Netherlands, Belgium and Ireland follow closely, with at least 20%. On the other hand, enterprises in Cyprus, Hungary, Austria and Bulgaria barely use big data at all.

Already before the COVID-19 outbreak, one in five EU enterprises made online sales. For 2019, online sales amounted to 18% of total turnover of companies that employ 10 or more people. Between 2013 and 2019, the percentage of companies selling online increased by 3.5 percentage points and the turnover of these companies realised from online sales increased by 4.5 percentage points[70].

68 The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. Source: European Commission, Shaping Europe's digital future, The Digital Economy and Society Index (DESI) (webpage).
69 The DII score (0-12) of an enterprise is determined by how many of the selected digital technologies it uses.

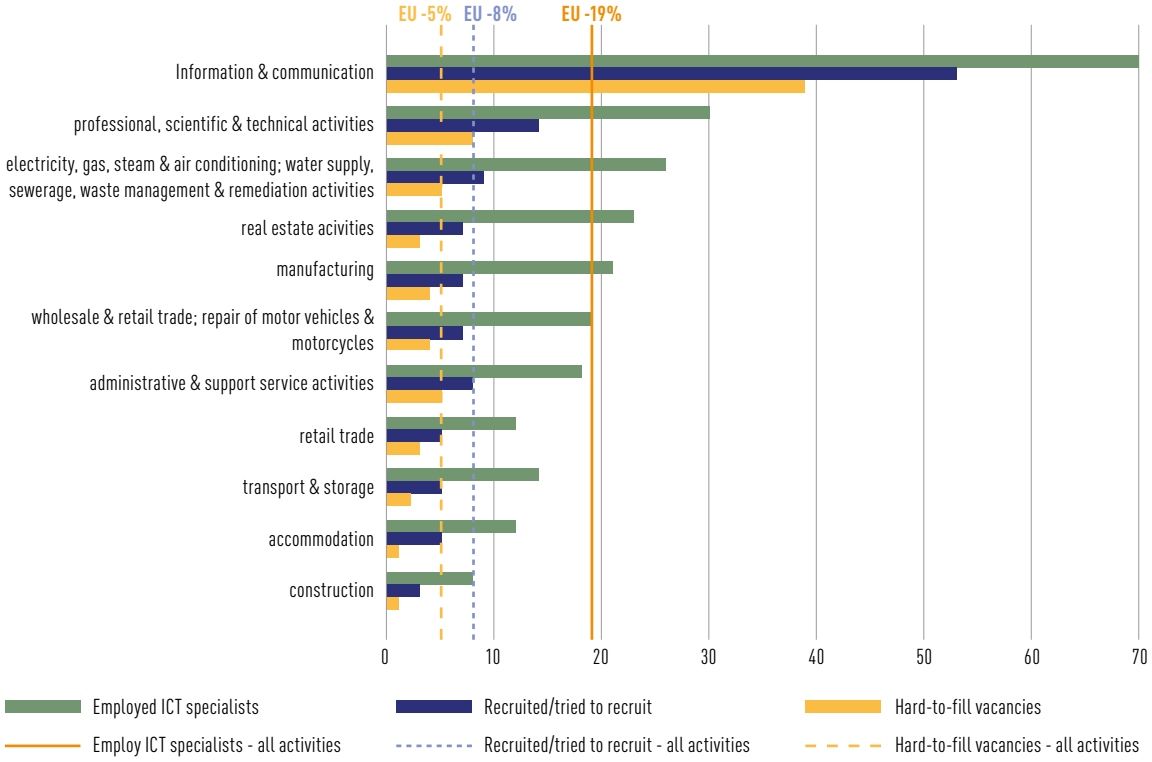
3.1 General EU overview

Figure 7: Individuals who have basic or above basic overall digital skills - % (2019)



Source: Eurostat (soc_sk_dskl_i)

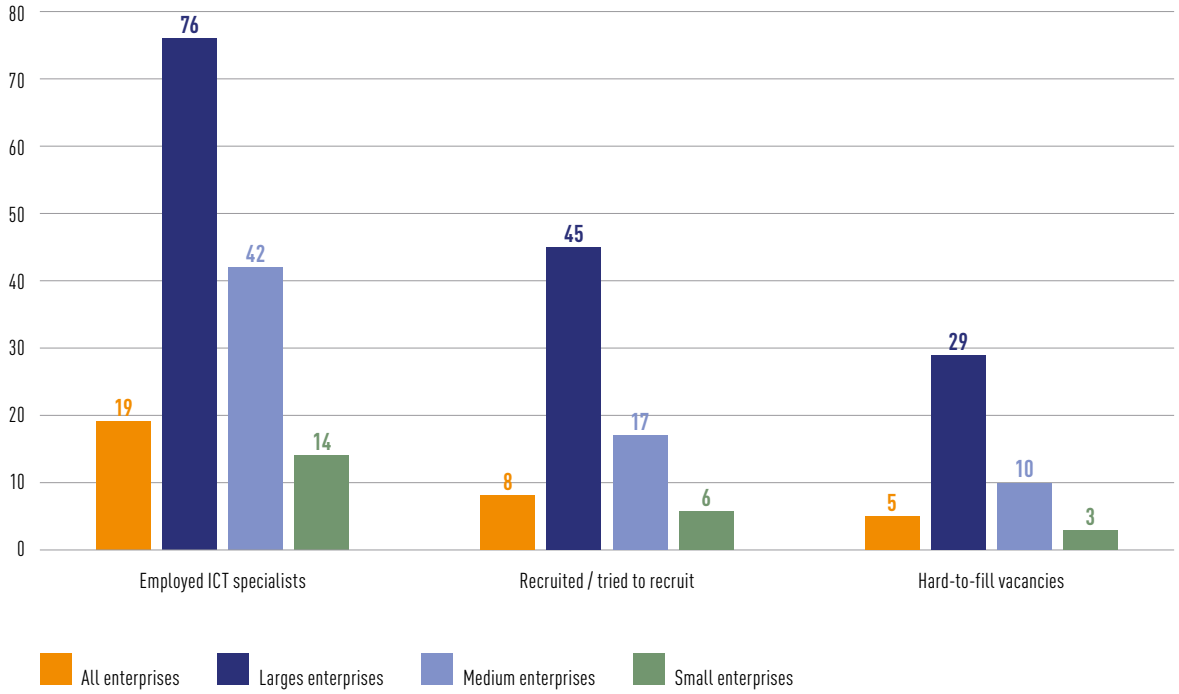
Figure 8: Enterprises employing, recruiting and having hard-to-fill vacancies for ICT specialists, by economic activity, EU, % enterprises (2020)



Source: Eurostat (isoc_ske_itspen2) and (isoc_ske_itrcrn2)

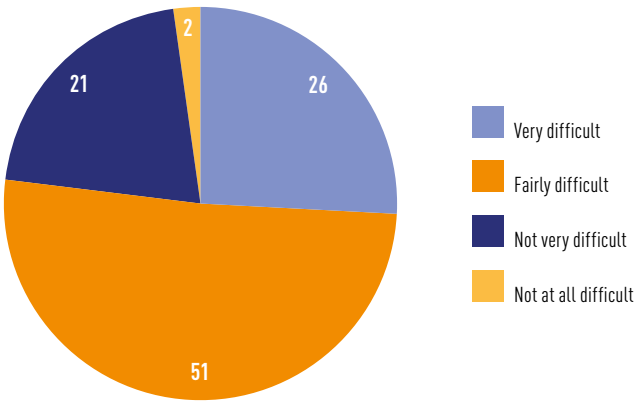
70 A recent McKinsay study has found that COVID-19 brought about years of change in the way enterprises in all sectors and regions do business. It noted that enterprises have accelerated the digitisation of their customer and supply-chain interactions and of their internal operations by three to four years. The share of digital or digitally enabled products in their portfolios accelerated by seven years. It was also noted that among the biggest differences between the enterprises that most successfully navigated COVID and all others is talent and the use of cutting-edge technologies. A related imperative for success is having a culture that encourages experimentation with new digital technologies and acting early to bring new innovations to market (McKinsay, 2020). McKinsay & Company (2020), How COVID-19 has pushed companies over the technology tipping point—and transformed business forever. Available online <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/how-covid-19-has-pushed-companies-over-the-technology-tipping-point-and-transformed-business-forever>.

Figure 9: Enterprises employing, recruiting and having hard-to-fill vacancies for ICT specialists, by size class, EU, % enterprises (2020)



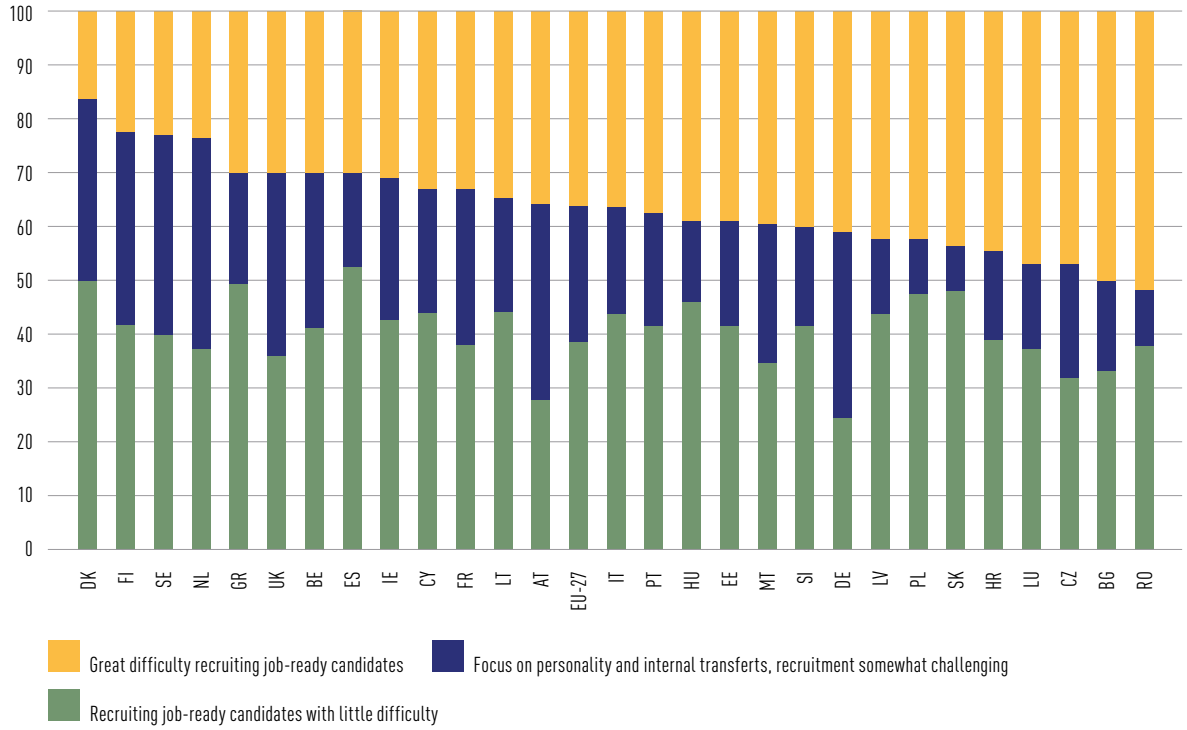
Source: Eurostat (isoc_ske_itspen2) and (isoc_ske_itrcrn2)

Figure 10.1: Difficulty finding employees with the required skills, EU-27, % (2019)



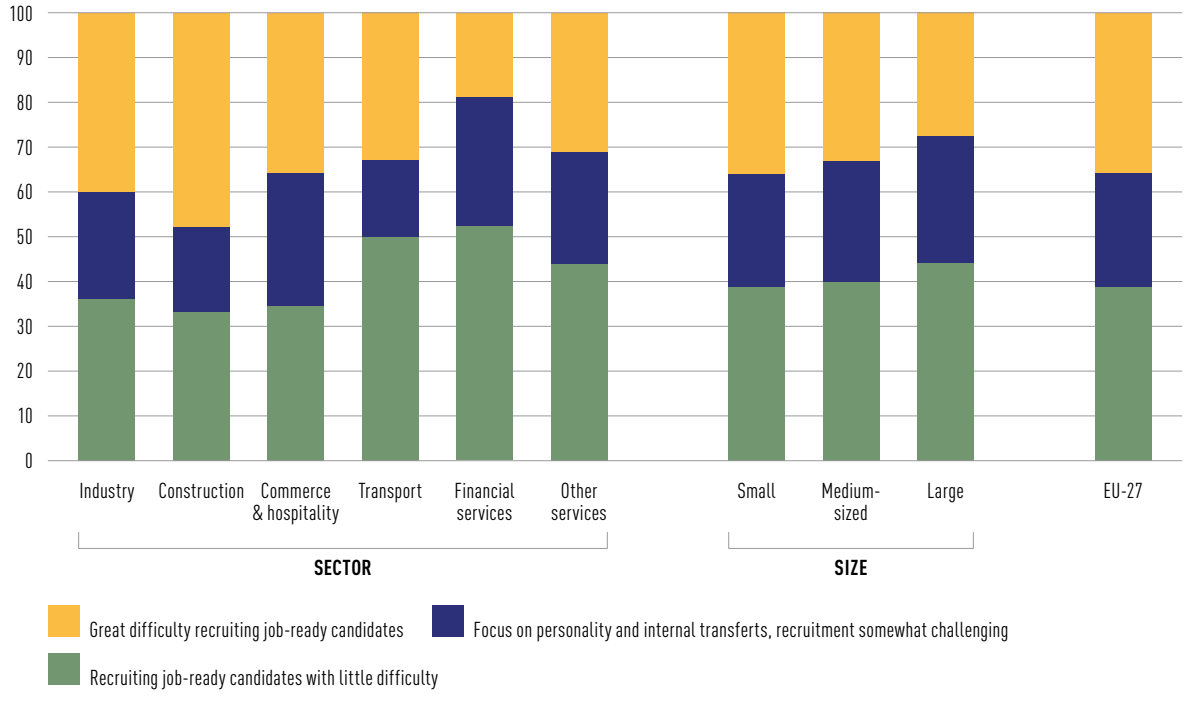
Source: Eurofound and Cedefop (2020), European Company Survey 2019: Workplace practices unlocking employee potential, European Company Survey 2019 series.

Figure 10.2: Difficulty finding employees with the required skills, EU-27, %, Establishment type – recruitment, by country (2019)



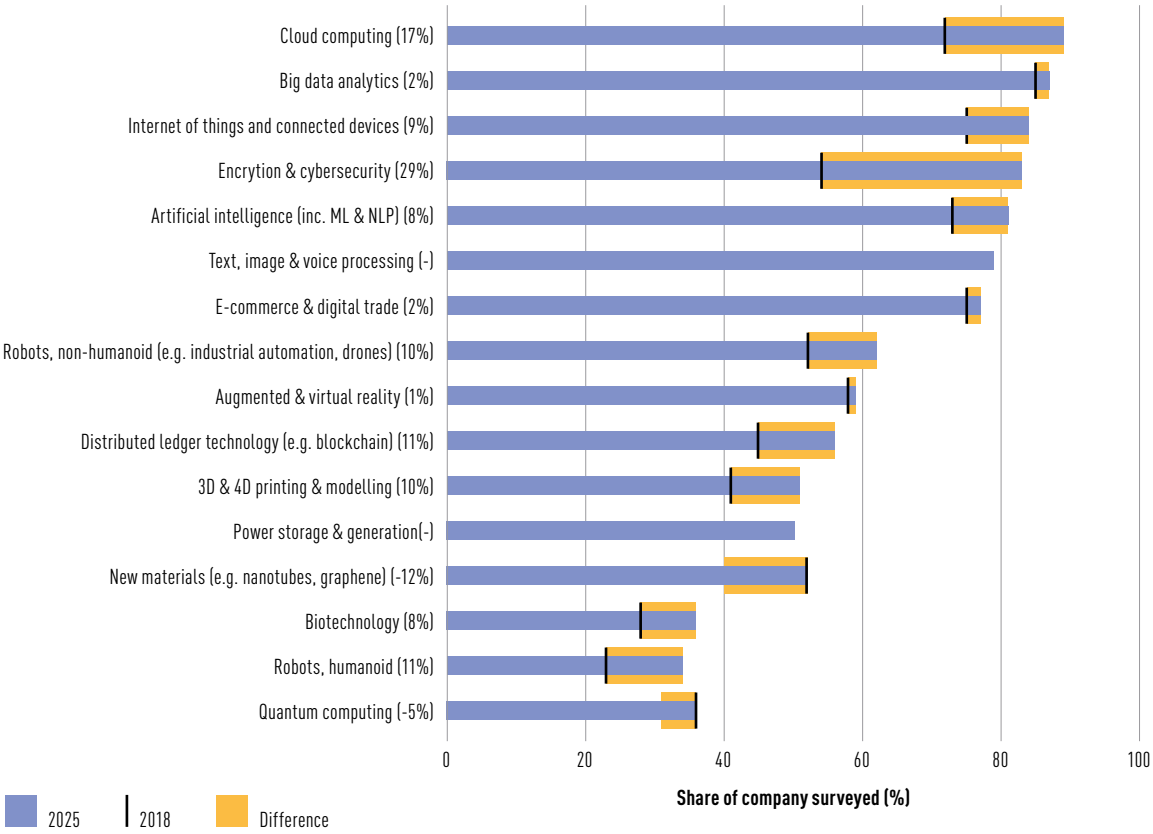
Source: European Company Survey - management questionnaire (2019)

Figure 10.3: Difficulty finding employees with the required skills, EU-27, %, Establishment type – recruitment, by sector and establishment size (2019)



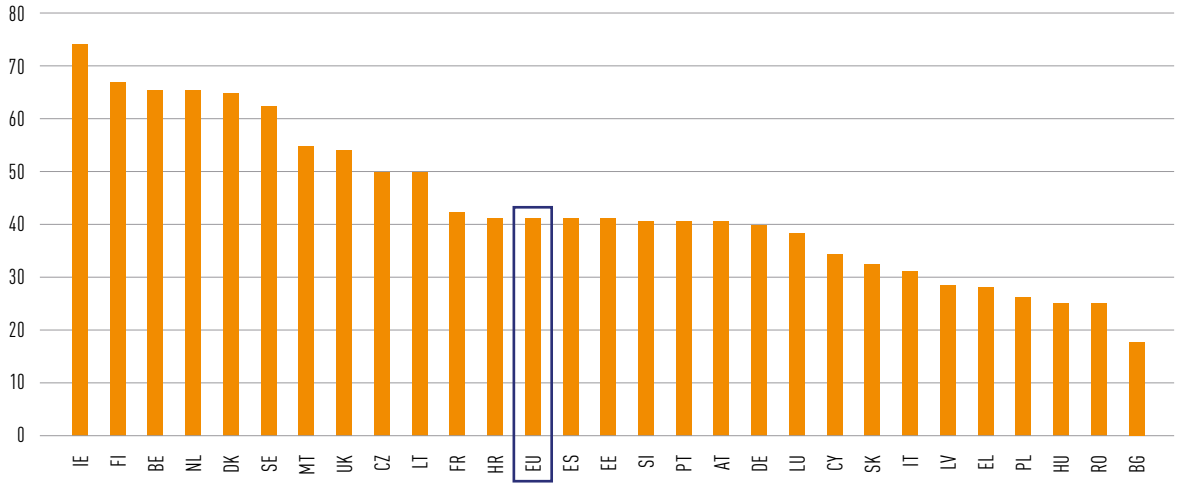
Source: European Company Survey - management questionnaire (2019)

Figure 11: Technologies likely to be adopted by 2025 (by share of companies surveyed)



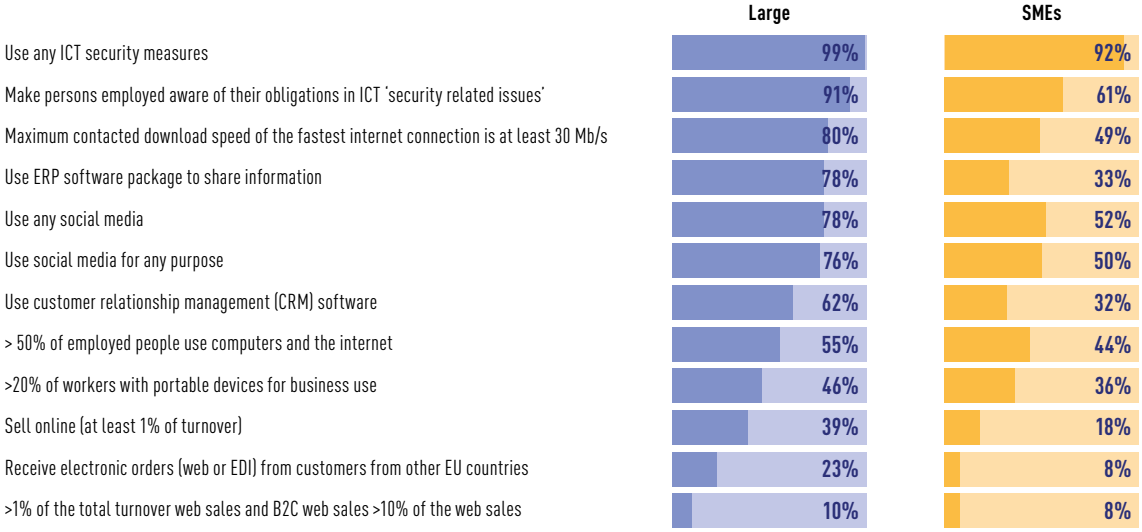
Source: World Economic Forum (2020), Future of Jobs Survey

Figure 12: Integration of digital technologies



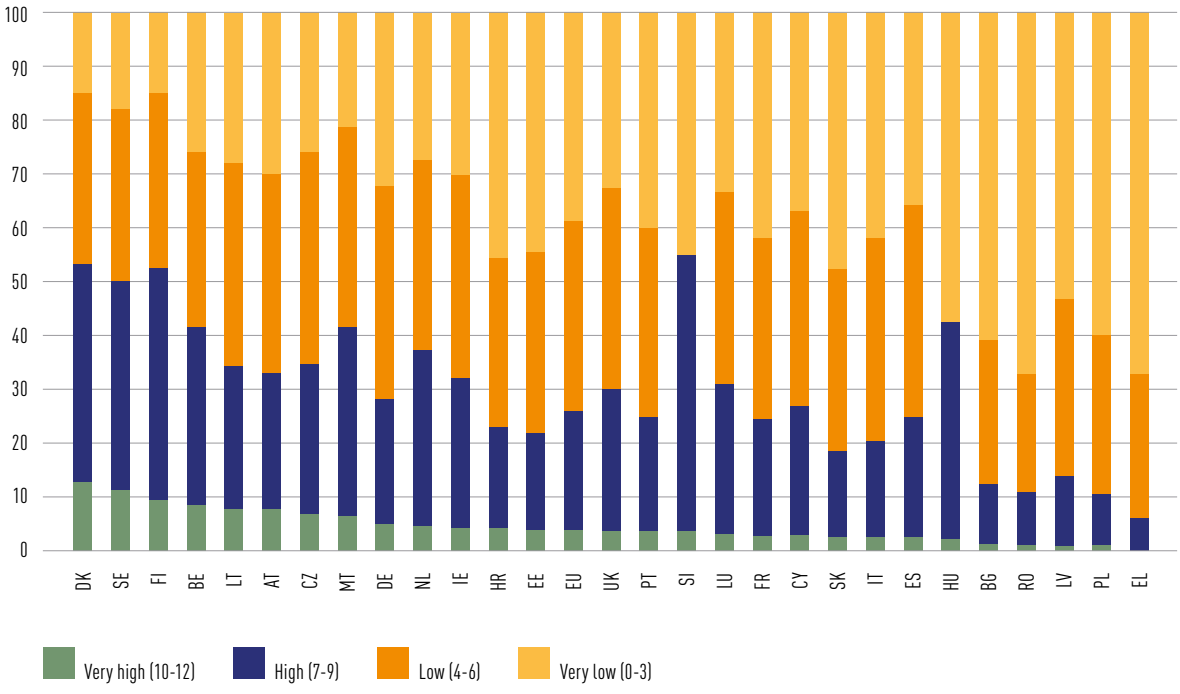
Source: European Commission, Digital Economy and Society Index (DESI) (2020)

Figure 13: Digital Intensity Index, indicators tracking digitisation processes (% enterprises) by enterprises size (2019)



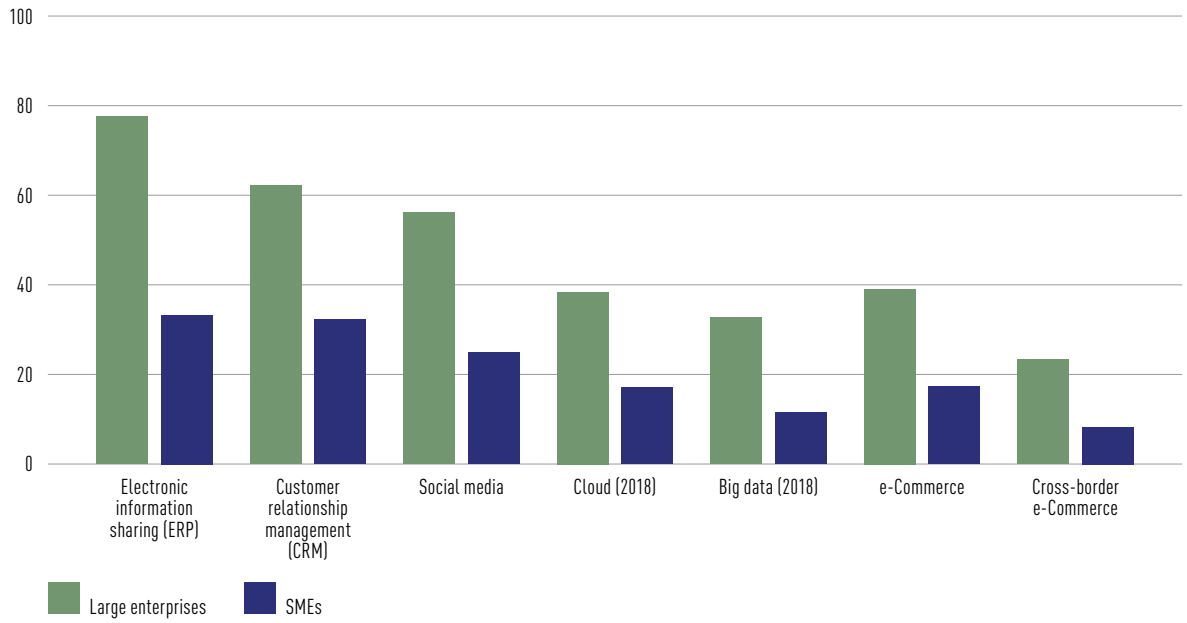
Source: Eurostat, Community survey on ICT usage and e-commerce in enterprises (2020)

Figure 14: Digital Intensity Index by level, % of enterprises, EU (2019)



Source: Eurostat, Community survey on ICT usage and e-commerce in enterprises (2020)

Figure 15: Adoption of digital technologies, % enterprises, EU, by enterprises size (2019)



Source: Eurostat, Community survey on ICT usage and e-commerce in enterprises (2020)

3.2 A spotlight on target countries | best and less successful practices

The present section presents a collection of cases based on desk research and in-depth interviews results and where relevant via the online survey. In more detail, information concerning skills matching tools mentioned by interviewees (both in the context of the in-depth interviews and collected through the survey) have been integrated thanks to findings from the Cedefop *"Matching skills"* portal [71] which showcases a collection of policy instruments from EU Member States that use information on labour market trends and anticipated skill needs to inform and shape upskilling or other skills matching policies for the current and future world of work.

The following examples should be interpreted as an overview of the selected practices at a country, sectoral and enterprise level on target countries.

71 <https://www.cedefop.europa.eu/en/tools/matching-skills>

[Sweden][72] Fully operational since 2017, the "Matching Map" (Matchningskartan) is a tool explicitly designed to address skill mismatch and consists of around 17500 combinations of 123 educational and 143 occupational groups, with detailed codes for the level of match for each combination. The codes show the match both in regard to level of education, field of education and future labour market demand. Together with register data, the Matching map enables detailed statistics of skills match in the population, for example the number of educated working within their subject field, the share of over- and undereducated employees, as well as comparisons between regions and different social groups. The Matching map is owned and administered by Statistics Sweden but is a critical component in the production of statistics of skills match. This statistic was originally developed by the Swedish regions through a regional R&D-organisation called Reglab. Since 2015, this statistic is administered by Swedish Agency for Economic and Regional Growth. The goal is to enable detailed, grounded and complex analysis on skills match on the labour market. The extensive work that lies behind the Matching map is made in an attempt to develop the method for measuring skills match, taking it beyond direct comparisons between the classification of educations and the classification of occupations. Assessing the skills match through directly comparing an individual's educational level or field with his/her occupational level/field, risks (at least in Sweden) to lead to misleading conclusions. One common reason for this is that many occupations in practice allow or require a different educational level than the stated, for example through changes in the educational system or in the employers' demand. Another reason is that many occupations, such as analyst or private instructor, cannot be reduced to one single field of education. The objective with the Matching map is therefore to provide policy makers, employers, labour market analysts etc. with better statistics on skills match, in relation to a wide range of policy areas.

- Sweden faces shortages[73] of Verbal and Reasoning Abilities and these are stronger than in the average of the OECD. Shortage of Instructing and Social Perceptiveness Skills are also higher than in the OECD average. Sweden faces intense shortages in many Knowledge areas, especially in Education and Training, while surpluses are observed in areas such as Mechanical Knowledge and Production and Processing." (OECD, 2018a, p.1).
- In Sweden approximately 7 out of 10 jobs facing skills shortage are in occupations requiring high skills[74]. This share is substantially higher than in the rest of the OECD. About 22% of jobs that are hard-to-fill require medium-skill while only 4% require low-skilled (lower than in the average of the OECD).
- The Education sector is facing the most intense occupational shortages in Sweden. The sectors with the largest surpluses are Agriculture, Forestry and Fishing as well as the Accommodation and Food Service sector[75].

72 Besides the Marching Map, also the Occupational Compass (Yrkeskompassen) should be mentioned: it is a guidance service with an open-access website that shows prospects for about 200 professions. It is primarily aimed at people who need support in their career choices or work. Provide job seekers and others concerned with advanced labour market information, in order to match demand and supply of skills. Deliver short-term (1 year) and long-term (5-10 years) skills anticipation for around 200 occupations (80% of the labour market), supported by advisory councils at sector level, alongside a council of vocational experts. The service is directed to users by the Swedish Public Employment Service. Job seekers, study and career counsellors, providers of education etc. can all use the service. The government is funding the service via annual grants to the Swedish Public Employment Service, who is implementing and developing the service, and updating the website.

73 Skills shortages occur when the skills sought by employers are not available in the pool of potential recruits, whereas skills surpluses occur when the supply of certain skills is higher than the demand for them. The OECD Skill Needs Indicators measure the degree of shortage (positive values) and surpluses (negative values) for a range of dimensions, such as Skills, Abilities, and Knowledge areas. Results are presented on a scale that ranges between -1 and +1. The maximum value reflects the strongest shortage observed across OECD (31) countries and skills dimensions. Recently, France Stratégie opted for a opted for the term "'apparent skills mismatch' to refer to the situation of individuals whose skill level is substantially different from others. (...) In our view, differences in skill levels do not necessarily mean that individuals are in jobs that are inappropriate to their skills level.". For a detailed overview of the four different scenarios of skills mismatch see France Stratégie (2021), Op cit, p.10-11.

74 High-skilled workers refer to ISCO occupational groups 1-3, medium-skilled to group 4-8 and low-skilled to group 9. Data refers to latest year available. Source: OECD (2018a)

75 Sector shortages occur when firms struggle to find appropriate talent. Surplus arises when the supply of workers in that sector exceeds demand. Results are presented on a scale that ranges between -1 and + 1 . The maximum value reflects the strongest shortage observed across countries, sectors and skills dimensions. Source: OECD (2018a) Op cit., p. 2.

> Approximately 4 out of 10 workers in Sweden are either over- or under-qualified[76] for the work that they are doing. In Sweden over 50% of graduates in the fields of Arts and Humanities, Natural Sciences, Mathematics and Statistics and Agriculture, Forestry, Fisheries and Veterinary work in a job different from the field they specialised in (field-of-study mismatch).

[Germany] Germany is experienced in technology foresight (as defined by ETF, CEDEFOP, ILO, 2016a Op. cit.), which has been developed for more than 20 years[77]. Initiatives using technology foresight are targeted to the adoption of concrete political actions. This approach is mainly oriented towards technology foresight without direct focus on skills needs identification, but it provides important contributions to the further development of the high-tech strategy and innovation policy of the Federal Ministry of Education and Research (BMBF). This ministry also employs innovation and technology analysis (ITA), which studies the functioning of, and changes in, research and innovation systems, supporting courses of action but also using results for education and ministry strategy. Most of these projects are based on objectives set out in the high-tech strategy. The high-tech strategy is the first national concept to involve key stakeholders in innovation around a common idea. It was launched in 2006, and in 2010 the federal cabinet decided to continue its use. The high-tech strategy 2025 will ensure the continuity of the overall approach and identify new priorities. Its aim is to make Germany a leader in providing scientific and technical solutions to challenges in the fields of climate/energy, health/ nutrition, mobility, security and communication. Innovative technologies and services create new jobs, and so every generation will have the chance to develop its potential. With specific reference to a tool explicitly designed to address skill mismatch, the "Skilled workforce bottleneck monitor" (Fachkräfteradar) should be mentioned. It is fully operational since 2012 and its goal is to enable different stakeholders (employers, employees, public stakeholders) to react to future skill mismatch. The instrument provides information on which occupational groups are already affected by skill shortages and where bottlenecks are likely to occur. The results are broken down by province. Together with the Arbeitsmarktmonitor (Labour Market Monitor), it features various functions, e.g. regionalised data on industries and occupations, visualisations of regional structural data, an overview of labour market relevant networks throughout Germany, success stories and contacts with experts in various labour market issues. Skilled worker shortage indicators by occupation, age, or gender presented on the website are calculated twice per year.

> "Germany faces intense shortages in Quantitative and Verbal Abilities, being these stronger than in the average of the OECD. Germany also faces shortages in several Skills and Knowledge areas, linked to strong demand in Sales and Marketing but also in Computers and Electronics and Mathematics Knowledge. Surpluses are observed in Food Production and Transportation Knowledge area" (OECD, 2018b, p.1.).
> In Germany 7 out of 10 jobs that are hard-to-fill are found in occupations requiring high skills. Demand for medium-skilled occupations is relatively lower (31%) and close to the OECD average of 39%.
> Financial and Insurance activities and Public Administration and Social Security are the sectors with the strongest relative occupational shortages in Germany. The sector with the largest surplus is Agriculture, Forestry and Fishing.
> Almost 4 out of 10 workers In Germany are either over- or under-qualified for the work that they are doing. In Germany over 50% of graduates in the field of Arts and Humanities and Education work in a job different from the field they specialised in (field-of-study mismatch).

76 Qualification mismatch describes a situation for which a worker has qualifications that exceed (overqualified) or does not meet (under-qualified) the ones generally required for the job. Field-of-study mismatch arises when workers are employed in a different field from what they have specialised in through their education. Source: OECD (2018a) Op cit., p. 2.

77 A good overview – especially on the Delphi and FUTUR approaches carried out in the 1990s and from 2001 to 2005 respectively – is provided by a case study on Germany in the UNIDO technology foresight manual (UNIDO, 2005).

[Estonia] The "OSKA[78]" policy instrument comprehensively addresses the issue of better matching the needs of the labour market with the provided education and training. The policy goal is to improve and tighten the linkages between the world of learning and the quantitative and qualitative needs and expectations of the labour market. The rationale for the intervention is the creation and implementation of a systematic process to engage all relevant stakeholders, so that they can provide input into skills anticipation and give recommendations to upgrade competency standards, provide relevant training and courses, also retraining possibilities. The general aim of OSKA is to teach and learn about the right skills relevant in the society. The OSKA system creates a cooperation platform, which enables the exchange of information between employers and training providers and educational institutions to comprehensively analyse the growth potential of different economic sectors and their needs, and to facilitate the planning of education provision at different levels of education and by types of school, as well as in the fields of retraining and in-service training. The OSKA system is designed to analyse and forecast (over a 5-10 year horizon) the labour market needs, both quantitatively (how many employees are needed in key occupations sector-wise) and qualitatively (which are the expected competence profiles in key occupations), and to recommend necessary adjustments in the education and training offer. The OSKA system is an amendment to the Estonian occupational qualifications system. OSKA combines the Ministry of Economic Affairs and Communications sectoral labour forecasts, national statistics, and expert knowledge. 5% of the programme is funded by ESF and 15% by the Estonian Ministry of Education and Research. The programme is governed by the Coordination Committee. The members of this Committee are representatives of principal stakeholders (the Ministry of Education and Research, the Ministry of Social Affairs, the Ministry of Economy and Communications, the Ministry of Finance, the Estonian Unemployment Insurance Fund, the Estonian Chamber of Commerce and Industry, the Estonian Confederation of Employers, the Estonian Employees' Unions' Confederation (TALO) and the Confederation of Estonian Trade Unions) Implementing role - The Estonian Qualifications Authority (SA Kutsekoda), SA Innove (rakendusüksus - implementation unit)..

- "In Estonia, Verbal and Reasoning Abilities are in shortage but less than in the average of the OECD. Shortages in social Skills such as Social Perceptiveness and Instructing are among the highest in Estonia, though lower than in the average of the OECD. Estonia also faces shortages in several Knowledge areas such as Computers and Electronic or Education and Training" (OECD, 2018c, p.1.).
- In Estonia 6 out of 10 jobs facing skills shortage are in occupations requiring high skills. Demand for medium skills is also robust (40% of jobs in shortage) and in line with the OECD average.
- The Education as well as the Information and Communication but also Arts, Entertainment and Recreation sectors are facing the largest occupational shortages in Estonia. The Construction sector is, instead, facing large occupational surpluses.
- 4 out of 10 workers in Estonia are either over- or under-qualified for the work that they are doing. In Estonia over 50% of graduates in the fields of Agriculture, Forestry, Fisheries and Veterinary, Natural Sciences, Mathematics and Statistics and Arts and Humanities work in a job different from the field they specialised in (field-of study mismatch).

78 OSKA applied research surveys on sectoral needs for labour and skills are unique because they use a combination of qualitative and quantitative research methods and analyse professional qualifications across all levels of education. For this purpose, both statistical data and information collected from personal interviews with sectoral experts and from group discussions are used. Five economic sectors are examined each year. Each sector is analysed every six years on average. In the intervening years, the relevant sectoral expert panels keep an eye on the implementation of the recommendations made on the basis of the conclusions of the survey. Quantitative analysis builds on the data from the relevant registers and surveys (EHIS, the Labour Force Survey, the Population and Housing Census 2011, sectoral surveys, EKOMAR, etc.) as well as on the forecasts of labour requirements prepared by the Ministry of Economic Affairs and Communications. Further information on employment, skills and qualifications is collected from personal interviews with sectoral experts and from group discussions. The interviews examine future economic trends and the resulting changes in the needs for workers, skills, education and training in each sector, and provide input with suggestions for improving qualifications. Sectoral expert panels also assess labour requirements in quantitative terms and training capacities broken down by key professions. An OSKA general report on changes in labour requirements, labour market developments and the trends influencing them over the next 10 years is prepared annually.

[France] The aim of "Prospective Métiers Qualifications (PMQ) -since 2013 Réseau Emploi Competences (REC)"- is to anticipate the skills needs in the different occupations to design the initial vocational education programmes and vocational training programmes. All the results about future jobs and skills needs are published and disseminated to those responsible for education and training programmes within the whole country. REC is a comprehensive programme about quantitative and qualitative trends in skills evolution, in which skill mismatches are emphasised. The main responsible bodies are France Stratégie (a directorate under the Prime minister) and Ministry for Labour (DARES - Direction de l'Animation de la recheche, des Etudes et des Statistiques). Ministries concerned (Ministries for Education, for Employment, for Health and social affairs, for Agriculture, for Youth). All these ministries have Vocational Commissions to determine the diplomas and certifications. Regional councils have competence for vocational training concerning the jobseekers and have created "regional skills monitoring centres" (CARIF-OREF). Social partners in the different sectors are in charge of Mutual Funds for training and adult education, and they have created sectoral skills monitoring centres. Experts. PMQ and REC are intended to have a general interest and are used by all the stakeholders of the education and training institutions and providers (ministries, regional councils, PES, sectoral and intersectoral mutual funds for employees and jobseekers training). The jobseekers are oriented through their PES counsellors, who used the REC results. The REC network gathers all the data and analysis from the Regional Skills monitoring centres and from the sectoral skills monitoring centres. They have all the data from the National Statistic institute and when necessary, carry out specific studies. In addition, recently France launched the "Transitions collectives" policy tool. Since January 15, 2021, the so-called Transco system makes it possible to anticipate economic changes of companies by supporting volunteer employees towards a *"serene, prepared and assumed retraining"*[79]. This new system aims to protect low-skilled employees whose jobs are threatened, by offering them certifying training for up to 24 months or validation of prior learning preparing them for promising jobs or jobs in sectors that are struggling to find their way. While retaining their remuneration and their employment contract, employees benefit from training funded by the State, with the aim of accessing a promising profession[80] in the same territory (employment pool). This new tool foresees the active involvement of social partners[81]: employers must engage in social dialogue to identify weakened jobs in the company and include them in a GEPP-type agreement (management of jobs and career paths). However, in companies with less than 300 employees, not subject to the obligation to negotiate on the GEPP, the agreement may consist of the simple formalization of the list of jobs concerned. The Social and Economic Committee must also be consulted. Companies engaged in the process of safeguarding employment (PSE) or collective contractual termination are excluded from the system for jobs affected by these measures. The employee volunteering to enter the system must meet certain conditions, in particular: justify the same seniority as for a professional transition project (articles D6323-9 and R6323-9-1 of the Labor Code), obtain an authorization of absence of his employer and carry out a prior positioning action with a training provider in order to adapt the duration of the training[82].

- "In France, Verbal and Reasoning Abilities are in shortage, but the intensity of these imbalances is lower than in the average across the OECD. France faces, instead, intense shortages in Skills areas such as Instructing and Management of Personal Resources, these being stronger than in the OECD. Several Knowledge areas are also in shortage, especially Education and Training, Clerical and the Knowledge of Mathematics." (OECD, 2018d, p.1.).
- In France over 6 out of 10 jobs that are hard-to-fill are in occupations requiring high skills. Demand for medium-skilled workers is 30%, lower than the OECD average, while demand for low-skilled occupations is 6%, close to the average across the OECD.
- In France, the Education sector experiences the most acute occupational shortages. Some occupational surpluses are instead observed in the Information and Communication sector, as well as in the Arts, Entertainment and Recreation sector.
- Almost 4 out of 10 workers in France are either over- or under-qualified for the work that they are doing. In France, over 60% of graduates in the field of Natural Sciences, Mathematics and Statistics and Arts and Humanities work in a job different from the field they specialised in (field-of-study mismatch).

79 Unofficial translation by the Author. Source: Ministère du Travail, du Travail, de l'Emploi et de l'Insetrion, «Transitions collectives» : anticiper et accompagner la reconversion de vos salaries (press release).

80 These are emerging professions resulting from new fields of activity or professions in sectors which are struggling to recruit.

81 For a more detailed overview, see Instruction n° DGEFP/SDPFC/MDFF/2021/13 du 11 Janvier 2021 relative au déploiement du dispositif «transitions collectives».

82 The funding mechanism of "Transitions collectives" will be analysed in Thematic report #3.

[Italy] The "Permanent National Information System for occupational needs" (Sistema nazionale permanente per i fabbisogni professionali (per le professioni) implemented by INAPP (National Institute for Public Policies Analysis, once ISFOL) and Istat (the National Institute for Statistics), provides data and information about professions' contents, quantitative relevance-, short- and medium-term trends, characterising competences and vacancies. The available data and information are targeted to the general public, but also to policies' decision makers. The system provides qualitative and quantitative information about economic trends, labour market forecasting and professional trends and provides information about the features of the so-called "professional unit" (unità professionali), professional needs, classified into professional units, linked to labour market trends; mid-term professional needs stimulated by new trends in sectoral economies, mid-term economic trends at the national level; economic trends at the local level; and employment forecasts for professional categories, both nationally and locally. The instrument is a part of a more general programme aimed at integrating all the different institutional databases and regular surveys concerning occupational, skills/competences and labour market trends and dynamics. The underpinning idea is that from the integration of the existing different sources, especially if diffused through a dedicated and easy to use website, a relevant added value may arise for citizens, employed and unemployed, guidance and counselling professionals, and decision makers in general. The other involved stakeholders implement surveys, research, studies and analysis, which are integrated by INAPP within the Sistema Informativo sulle Professioni and made visible through its dedicated website. The stakeholders are: Istat (National Institute of Statistics); INPS (National Institute for Social Security); INAIL (National Institute for Safety at Work); Unioncamere (the national network of the Chambers of Commerce); the Ministry of Education, University and Scientific Research; the Ministry of Labour and Social Policies; and the association of temporary work agencies. INAPP itself bestows the outputs of its recurring analyses and surveys on professions, occupation and labour markets to the System. Unioncamere, together with INAPP is also involved in the continuous analysis in the context of the so-called Sistema Informativo Excelsior. The Excelsior System -ranks among the major sources available in Italy on labor market issues. Starting from 2010, the Excelsior Information System also provides forecasts on employment needs a medium term (five-year horizon), through a multisectoral econometric model and with a similar to that followed at European level by Cedefop. Currently the forecasts refer to the period 2021- 2025 and are detailed by economic sector, type of occupation, professions, levels of education and main fields of study. The model, which enhances the information acquired periodically through surveys Excelsior conducted at Italian companies in the industry and services, allows to anticipate the evolution of employment for 35 sectors (including the Public Administration) and to derive employment needs (excluding agriculture, forestry and fishing) by professional group, level of education and main training addresses. Moreover, the System provides short-term information which are collected and disseminated through volumes deriving from the monthly surveys of carried out by Unioncamere in agreement with the National Agency for Active Labor Policies. The survey, which is included in the Italian National Statistical Program (UCC-00007) among those that provide for the obligation to reply, has been carried out on a monthly basis since 2017.

- "In Italy, Verbal, Reasoning and Quantitative Abilities are in shortage and relatively more than in the average of the OECD. Italy experiences shortages in several Knowledge areas as well, with Computers and Electronics being the most pronounced one and well above the OECD average. Some surpluses are observed in the Knowledge areas of Building and Construction as well as in Public Safety and Security." (OECD, 2018e, p.1.).
- In Italy, approximately 6 out of 10 jobs facing skill shortage are in high-skilled occupations, while 31% and 6% of jobs that are hard-to-fill are in medium- and low-skilled occupations, in line with the average across the OECD.
- Professional, Scientific and Technical occupations and Information and Communication sector are facing the most acute occupational shortages in Italy. The sectors with the largest surpluses are Construction and Accommodation and Food Service activities.
- 4 out of 10 workers in Italy are either over- or under-qualified for the work that they are doing. In Italy over 50% of graduates in the fields of Arts and Humanities, ICT and Agriculture, Forestry, Fisheries and Veterinary work in a job different from the field they specialised in (field-of-study mismatch).

[Romania] In Romania, the "Partnership analysis and labour market forecasting system with continuing adaptation to economic dynamics[83]" since 2015 is used to better inform employers in the labour market and to assist in targeting the interventions of the National Agency for Employment. The aim is to respond to a growing need of updated information from employers, social partners and other stakeholders of the labour market, in order to improve access to labour market information, to deal with mismatches, as well as to enhance the capabilities of the National Agency for Employment to provide and elaborate labour market analyses and forecasts. By providing in depth analysis and forecast, including at the regional level and by occupation, it assists employers in meeting their skills need and filling their skills' gaps. It also enables the public employment services to better target its supply of specific interventions and thus allocate resources efficiently. The National Research Institute in the field of Labour and Social Protection of Romania (INCSMPS) has been the main partner that has designed the technical part of the instrument and supplied the methodology for the forecasting instrument, as well as performing regular updates upon request. However, monitoring, evaluation and maintenance are entirely the responsibility of the National Agency for Employment (NAE). The other stakeholders have been involved in the testing of the instrument, as well as in the validation of the data from forecasting. The current functioning of the system (following termination of the ESF financed project) is financed from the annual budget of the PES. Progress is measured by the National Agency for Employment, looking at the number of users and the number of forecasts and analysis produced.

- "In Romania, Quantitative, Verbal and Reasoning Abilities show intense shortages. Shortages in the Skills areas of System Evaluation and System Analysis are also high, and stronger than that of the average across the OECD. Romania also faces shortages in most Knowledge areas, especially for Mathematics Knowledge and Computers and Electronics, which both have stronger shortages than across the OECD." (OECD, 2018f, p.1.).
- In Romania 6 out of 10 jobs facing skill shortage are in occupations requiring medium skills. About 35% of jobs that are hard-to-fill are in occupations requiring high-skills while 7% are in jobs requiring low-skills.
- The Education sector is the one facing the most acute occupational shortage in Romania. The sectors with the largest surpluses are Agriculture, Forestry and Fishing and Administrative activities and Support activities.
- 3 out of 10 workers in Romania are either over- or under-qualified for the work that they are doing. In Romania, over 50% of graduates in the fields of Natural Sciences, Mathematics and Statistics, Arts and Humanities, ICT and Agriculture, Forestry, Fisheries and Veterinary work in a job different from the field they specialised in (field-of-study mismatch).

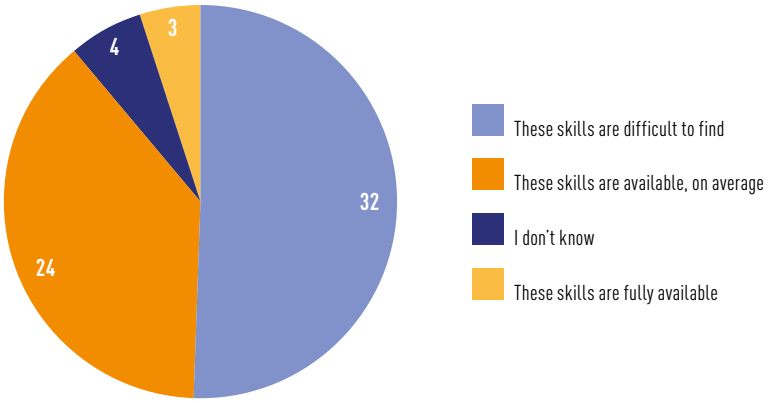
83 Sistem partenerial de analiza si prognoza pentru piata muncii adaptat continuu la dinamica economica - POSDRU 180/4.1./S/155259. It is a ESF financed project.

3.3. What does the survey say?

This section provides a preliminary overview of the online survey's results concerning the topic investigated in the present report and corresponding to questions Q26-Q46 [84].

In first place, respondents were asked "To what extent do workers/people entering the labour market for the first time have these skills in your Country/Sector/Company?" [85] The chart below illustrates the feedback received.

Figure 16: Perceived level of skills matching

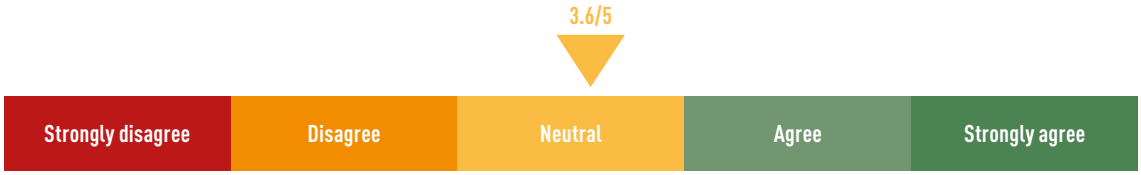


Only one respondent from each of the following countries selected the option "These skills are fully available": Spain, Germany, Belgium. Subsequently, respondents were asked to express their opinion about the importance of workplace training for developing such skills [86] and on a scale from 1 to 5, the average score resulted in 4.57/5 [87]. In addition, respondents were asked if, as for their knowledge, workplace training results in validation processed and in 30 out 64 feedback interviewees selected the option "there is a validation process (internal)", while 21 interviewees declared "there isn't a validation process" and 13 "there is a validation process (external validation solutions)". In more detail, respondents were asked also to provide examples of how their organisations/union/companies evaluate the learning outcomes from training: in the majority of cases respondents indicated: internal questionnaires and self-evaluation provided directly by who participated in training (feedbacks regarding the quality of the training provided included). One respondent (company level, employer side) from Germany stated "Most training courses end with a final exam. The success of the measure is determined through the test. As well as the subsequent placement in the job market" and another one (emoployers' organisation representative, Germany) declared "In Germany, learning outcomes are assessed at the end of the training period by the chambers as competent bodies and training institution. The Chambers have implemented specific tripartite examination boards for initial, further and higher VET". A Spanish trade union representative stated that even if currently a study of the impact of the training received in the job has not been implemented, his/her organisation is working to implement one ad hoc tool.

Finally, interviewees were asked to provide their degree of agreement about the following sentence "The completion of training linked to recognition and career development".

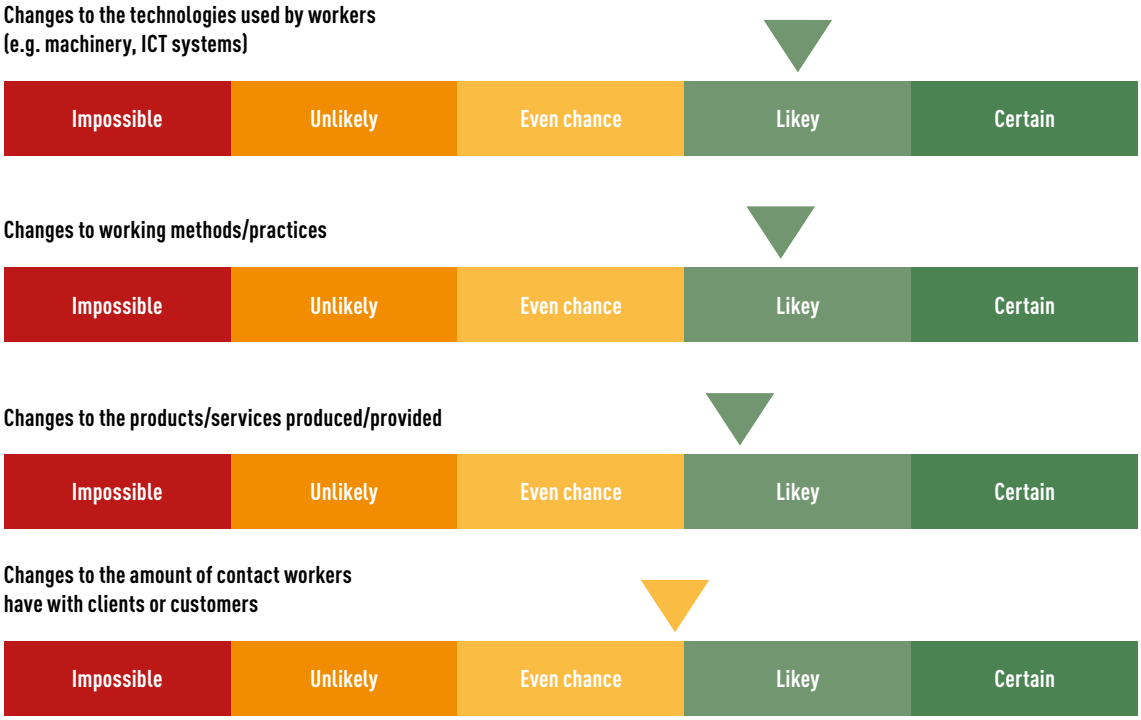
84 Section 3 - Game changing technologies and innovative approaches to the identification of new skills.
85 I.e. mismatches between the skills offered and those required on the National/Sectoral/Company level job market.
86 For a complete overview of the skills strategic for innovation as for the survey results, see Part 2, 2.
87 Minimum value: 3 This option was selected by No. three respondents: one belonging to an Italian national-level trade union active in the electricity, gas, steam and air conditioning sector, one Belgian national level employers' organisation and one company level employers' representative operating in the manufacturing sector.

Figure 17: Completion of training, recognition and career development



On the basis of a previous positive feedback to question "Has your Organization/Company/Union been involved in the identification of tasks and occupations highly subject to automation?", respondents were asked about the technological developments they anticipate in the next 5-10 year period to occur in their sector/s. The following figure illustrates the results rated by the number of feedbacks received.

Figure 18: Expected technological developments [5-10 years] [88]



Subsequently, interviewees were asked to provide an assessment of the effectiveness of employment services (public and private) in fostering training opportunities to adapt to new and emerging skills needs, including skills for innovation [89].

Figure 19: Effectiveness of employment services (public and private)

88 4,48 - 4,43 - 4,38 - 3,97.
89 1 to 5 Likert scale.

In this regard, one respondent belonging to an employers' organisation in Sweden declared "Currently we are waiting for a huge reform of the national system of public employment agencies. We hope for a better engagement and involvement of private entities in the field in the coming years". While one interviewee form Belgium (trade union representative) stated "Employment agencies are the meeting points of education[system] and labour ministries. They should communicate with both the channels, and unfortunately, in most of the countries it doesn't happen. In this field, the social partners play an interconnecting role, because they have a concrete look at the labour force, and they know what the employers expect about skills. Without the social partners and some NGOs, it is difficult for the labour agencies to fulfil their tasks".

Have respondents' organisations ever been involved in skills assessment and/or skills forecast/foresight exercise/s? Yes, in 33 out of 64 replies.

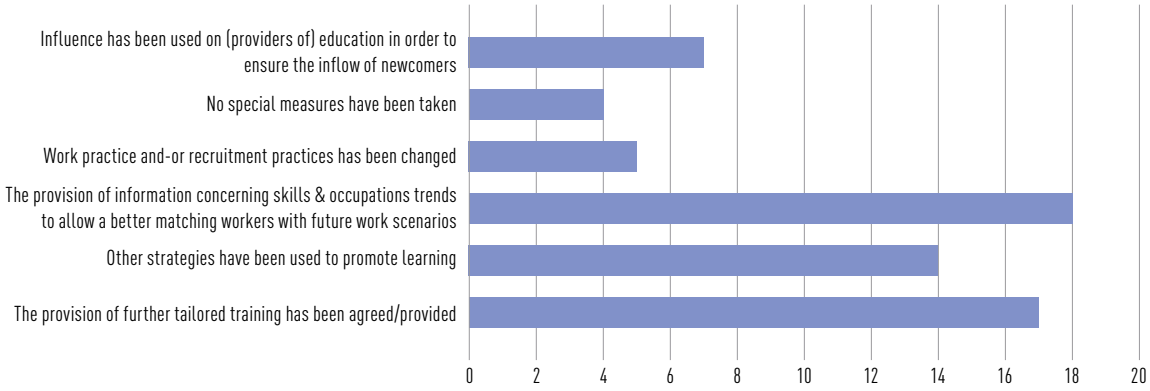
Table 7: Skills assessment and foresights/forecasts exercises: organisations' involvement

	Nr. of feedback received	An Enterprise/ workers' representative	An Enterprise/ empl	An Employers' Organisation	A Trade Union
Yes	33	1	4	15	12
Don't know	18		3	5	8
No	13	1	1	5	6

Among the reasons for not being involved in skills assessment and/or skills forecast/foresight exercise/s, respondents selected "lack of time" (5 feedback); "Lack of resources (human and/or financial)" (14 feedback) and only in two cases the option selected was "Initiatives considered not pivotal for supporting the innovation process." by a trade union representative in Belgium and a Greek respondent from an employers' organisation [90].

Moreover, in case of in case of skills mismatches identified as a result of skills assessment and/or forecast/foresight exercise/s in which respondents' organizations have been involved the following initiatives have been used to overcome the problem.

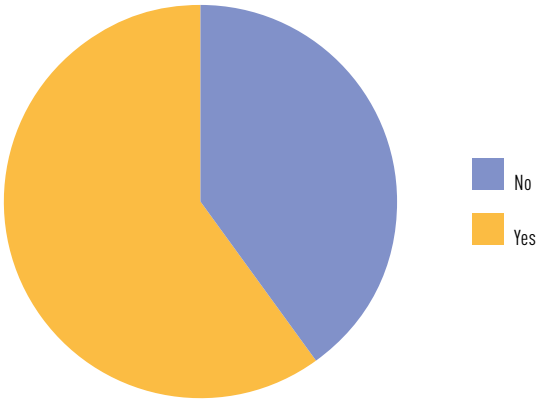
Figure 20: Measures undertaken to overcome skills imbalances



90 Other feedback include: Not in our area of competence/responsibility (2); "les employeurs avancent seuls" (1); "because of our business model/scope" (1).

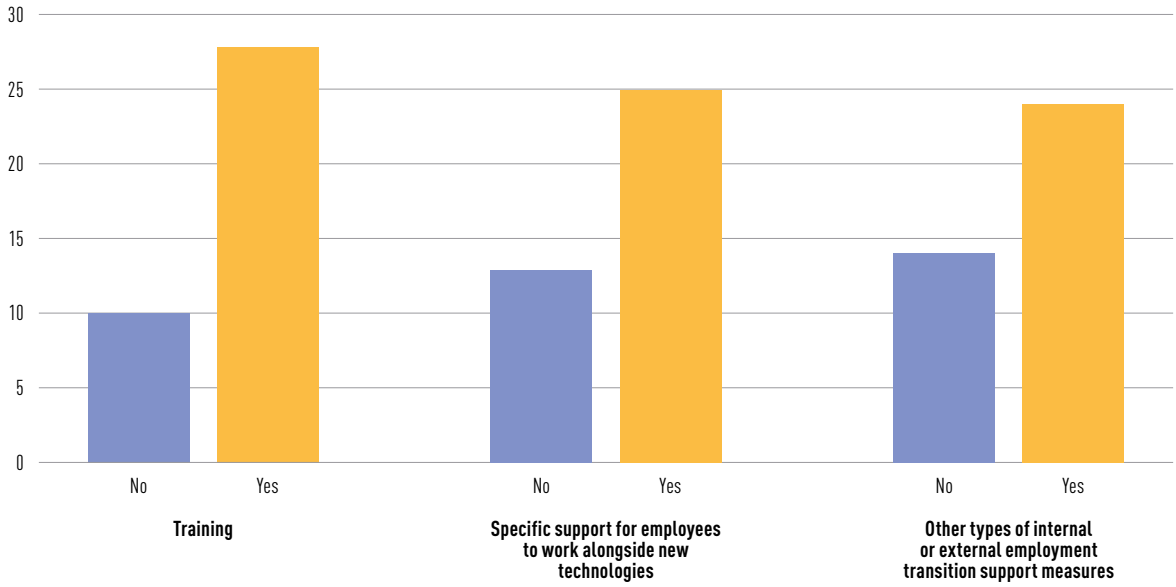
With reference to the automatability issue, respondents were also asked if, as for their knowledge, their Organization/Company/Union have been involved been involved in the identification of tasks and occupations highly subject to automation.

Figure 21: Identification of tasks and occupations highly subject to automation



In case of a positive feedback (Yes), respondents were indeed asked about the provision of the following services (Figure 22):

Figure 22: Involvement in provision of a selected list of services to minimize automation risks



4. FINANCIAL INCENTIVES FOR RESEARCH AND DEVELOPMENT AND SKILLS INVESTMENTS

"At a time when globalization, technological progress and demographic change are profoundly altering the types of jobs that are available, as well as how and by whom they are carried out, investing in skills is more important than ever to build resilient and inclusive labour markets that underpin social cohesion and well-being, and promote smart, sustainable and inclusive growth" (OECD, 2017). Against this scenario, the present chapter explores the role that financial incentives (such as direct subsidies, tax measures and subsidized loans) can play in helping promote more and better investments in skills so as to achieve a better match between their supply and demand, with specific reference to adult learning and CVET [91]. Indeed, as recently emphasised also by the International Labour Organization "Lifelong learning implies that individuals have access to learning (LLL) along their life course, whether they are employed or not, and there is renewed policy interest because it supports more effective labour market participation, contribution to economic growth and greater personal accomplishment. Despite the many documented benefits and positive externalities (e.g. higher productivity, employability, tax return) of lifelong learning for individuals, enterprises and societies at large, both training supply and demand tend to be lower than desirable due to market failures, such as assymetric information, adverse selection (e.g. when training providers exploit the low knowledge small enterprises have and offer inadequate training)." (ILO, 2021). Adopting a simple taxonomy, following OECD and Cedefop (CEDEFOP, 2015) guidelines which classify measures depending upon whether they target institutions, individuals, or employers, this chapter provides an overview of the extent to which, and how, countries (namely the six target countries) use such tools for steering education and training decisions (examples provided also in section 4.2). However, before discussing in more detail the above-mentioned topics, it is worth providing a brief description of countries' performances as for relevant statistical indicators. In the first place and considering also the insights emerging from the interviews phase, it is worth illustrating, as reference performances, the general government expenditure in education (Figure 23) and the R&D expenditure in Europe (Figure 24).

The R&D intensity indicator in the present analysis since it is a major driver of innovation, and R&D expenditure and intensity are two of the key indicators used to monitor resources devoted to science and technology worldwide. In 2019, the highest R&D intensity was recorded in Sweden (3.39%), followed by Austria (3.19%) and Germany (3.17%), all with R&D expenditure above 3% of GDP. At the opposite end of the scale, eight Member States recorded a R&D intensity below 1% of GDP: Romania (0.48%), Malta (0.61%), Cyprus (0.63%), Latvia (0.64%), Ireland (0.78%), Slovakia (0.83%), Bulgaria (0.84%) and Lithuania (0.99%).

Investing in CVET is not straightforward. For a long time, several surveys have highlighted the barriers to investing from the enterprises' side. *"About one in five companies in the EU report to have invested too little in the training of their workforce in 2017. This is a source of concern, as in an economic environment characterized by globalization, population ageing and technological progress it is necessary to constantly update the skills of the workforce, and firms have a key role in financing lifelong learning."* (G. BRUNELLO ET AL., 2020, 2). From an aggregate perspective, under-investment in training may occur because of externalities, i.e. the investing firm does not take into account that other firms and the economy at large could benefit from the investment in training (see for instance LYNCH L., 1994, and BASSANINI ET AL., 2007). Individual firms under-invest due to factors affecting the expected marginal benefits of training, including hold up problems, employee poaching and high staff turnover.

Data from the Eurostat continuing vocational training survey and in particular on the provision of CVET by enterprises refers to education or training activities which are financed, at least in part, by enterprises; part financing could include, for example, the use of work time for the training activity (EUROSTAT, 2020). CVET can be provided either through dedicated courses or other forms of CVET, such as guided on-the-job training. In general, enterprises finance CVET in order to develop the competences and skills

91 Continuing vocational education and training (CVET) is 'education or training after initial education or entry into working life, aimed at helping individuals to improve or update their knowledge and/or skills; acquire new skills for a career move or retraining; continue their personal or professional development' (Cedefop and Tissot, 2014, p. 51).

of the people they employ, hoping that this may contribute towards increasing competitiveness and productivity. A large majority of CVET is non-formal education or training, in other words, it is provided outside the formal education system [92]. In 2015 (last available data corresponding to the fifth edition of Eurostat CVET survey), 70.5 % of enterprises employing 10 or more persons in the EU-27 provided CVET to their staff (see Figure 1); this marked an increase compared with 2005 and 2010 when the corresponding shares were 55.6 % and 63.6 % respectively. Among the EU Member States, the share of enterprises that provided such training in 2015 ranged from 21.7 % in Greece to 99.9 % in Latvia (Figure 25).

Moreover, the fifth Eurostat CVET survey allows a more detailed analysis of the proportion of enterprises providing CVET: in general terms, in 2015 within the EU-27, enterprises in services (other than distributive trades or accommodation and food services) were more likely to offer CVET. This was particularly the case for the grouping of information and communication services and financial and insurance activities where the proportion of enterprises offering CVET peaked at 84.5 %. Enterprises in the EU-27 were slightly more likely to provide CVET through courses (either internal or external) than to provide other forms of CVET (such as planned learning through guided on-the-job training, job rotation, exchanges or secondments, conferences and workshops, participation in learning or quality improvement groups, or self-directed learning). In 2015, 60.2 % of EU-27 enterprises offered at least CVET courses and 56.7 % provided at least other forms of CVET [93]. The proportion of enterprises providing CVET courses exceeded 80.0% in Czechia, Austria, Sweden and Spain and was also above the EU-27 average in Belgium, Finland, the Netherlands, France, Slovenia, Luxembourg, Denmark, Estonia, Slovakia and Germany; it was even higher in Norway (at 90.4 %). By contrast, less than one quarter of enterprises provided CVET courses in Romania and Greece. The proportion of enterprises providing other forms of CVET had a slightly wider range, from below one quarter in Greece and Romania up to more than four fifths in Estonia and Sweden, peaking at 99.9 % in Latvia; the share recorded in Norway was again relatively high (at 93.4 %).

Comparing the proportion of enterprises providing CVET courses and those providing other forms of CVET, differences in excess of 10 percentage points were observed in 12 of the EU Member States, with enterprises in Finland, Spain, France and Czechia more likely to provide CVET courses, whereas enterprises in Poland, Lithuania, Germany, Portugal, Malta, Estonia, Ireland and Latvia were more likely to provide other forms of CVET (Table 8).

Finally, with reference to the participation rates for CVET courses, on average, enterprise size appears to be a relatively minor factor influencing the provision of CVET courses across the EU-27: in 2015, more than half (54.8 %) of all persons employed in large enterprises (with 250 persons employed or more) participated in CVET courses, compared with 48.5 % for medium-sized enterprises (with 50-249 persons employed) and 50.6 % of those employed by small enterprises (with 10-49 persons employed). It is interesting to note that in seven of the EU Member States the highest participation rates were reported for small enterprises, while small enterprises and medium-sized enterprises in the Netherlands recorded the joint highest rates. The most notable example was Germany as participation rates for CVET courses in 2015 were more than 10 percentage points higher among small enterprises than they were among large enterprises

With specific reference to CVET participation rates, data on the cost of CVET only relate to CVET courses and not to other forms of CVET. The data on the cost of CVET courses (as shown in Figure XX) have been converted, as for Eurostat standards, to purchasing power standards (PPS) [94] rather than presenting these costs in euros. In 2015, the average expenditure on CVET courses by enterprises in the EU-27 was 1 484 PPS per participant [95]; the average expenditure per participant on CVET courses ranged from 426 PPS in Czechia to 1 912 PPS in the Netherlands, with France (2 081 PPS), Belgium (2 337 PPS) and Denmark (3 439 PPS) above

92 For a detailed overview of the returns to formal, non-formal and informal training issue, see P. FIALHO, G. QUINTINI, M. VANDEWEYER (2019), Returns to different forms of job related training: Factoring in informal learning, OECD Social, Employment and Migration Working Papers No. 231.
93 Note that some of these enterprises provided both CVET courses and other forms of CVET.
94 Purchasing power standards are an artificial currency which adjusts for price level differences between countries.
95 For Eurostat, each person is only counted once, regardless of how many courses they attend during a year and regardless of the course duration.

this range. Among the 10 EU Member States where average expenditure per participant was below 1 000 PPS, eight were Member States that joined the EU in 2004 or 2007, with Portugal and Finland the only exceptions (Figure 26).

In the context of this report, it is useful to complement the data just presented with what has recently been reported by the ILO: *"Tertiary VET, apprenticeships and work-based learningcan be costly when compared with secondary or university based education, and also often have sub-optimal levels of uptake by learners, employers and education and training providers. For example, in Austria or Luxembourg the average public expenditure per student in TVET was $3,000 higher than a student in general education (World Bank Educational Statistics, 2017)"* (ILO, 2021).

Putting more emphasis on the interrelation between the results in the area of CVET provision and the ones in the field of innovation[96], it is worth providing a brief overview of where the target countries (Sweden, Estonia, France, Germany, Italy and Romania) stand in terms of "innovation performance [97] groups" as for the 2020 edition of the European Innovation Scoreboard (EIS) [98]. In fact, Sweden belongs to the first group of "Innovation Leaders" which includes 5 Member States where performance is above 125% of the EU average [99], while Estonia and France are fall within the "Strong Innovators" category (including 7 Member States with a performance between 95% and 125% of the EU average) [100]. Finally, Italy is a moderate innovator country (Moderate Innovators includes 13 Member States where performance is between 50% and 95% of the EU [101]) and Romania shows a performance level below 50% of the EU average, thus being classified as a "Modest innovator" country together only with Bulgaria.

In more detail, the European Commission considers the "Firm Investments" as one of the four domains for the measurement framework of the European innovation scoreboard and this domain includes the following three indicators:

- R&D expenditure in the business sector
- Non-R&D innovation expenditures
- Enterprises providing training to develop or upgrade ICT skills of their personnel [102].

With specific reference to the interplay between training and innovation and considering the size of the company, for the International Labour Organization, frequently the market presents a training offer which does not support innovation, productivity and growth in specific market segments and niches, due to a limited understanding of SMEs and their training needs. In the same way, the training on offer may not cater for the needs of more vulnerable groups and people working in informal sectors, who tend to have reduced access to formal training and social protection. *"In all these situations there is room for the development of funding strategies and incentives for learning based on social partner participation and effective public intervention. Social partners can have a particularly important role in the development of effective and efficient funding, by supporting collective agreements, sectorial councils as well as the development of training levies. Historically, government has moved from centralized public spending, to a decentralized, outcome-oriented model, based on shared responsibilities and with a more complex design."* (ILO, 2021).

Innovation is recognized as the major source of growth in modern economies. But because of knowledge externalities, private returns on research and development (R&D) are typically much lower than their social returns, hence the need for some public

96 Performance of European Member States' innovation systems.
97 The EIS performance groups are relative performance groups with countries' group membership depending on their performance relative to that of the EU. With the improved EU innovation performance over time, the absolute thresholds between these groups also increase, explaining why the dashed horizontal lines cross the vertical axis at higher percentage scores. Following the departure of the UK from the EU, EU average scores this year have declined compared to EU average scores in the EIS 2019, which would result in lower threshold values and possible changes in performance group for some countries. For the EIS 2020, thresholds have therefore been adjusted to ensure comparability of performance groups with the EIS 2019. Source: EUROPEAN COMMISSION (2020), European Innovation Scoreboard 2020, Publications Office of the European Union.
98 The performance of EU national innovation systems is measured by the Summary Innovation Index, which is a composite indicator obtained by taking an unweighted average of the 27 indicators.
99 The Innovation Leaders are Denmark, Finland, Luxembourg, the Netherlands, and Sweden.
100 Austria, Belgium, Estonia, France, Germany, Ireland, and Portugal are Strong Innovators.
101 Croatia, Cyprus, Czechia, Greece, Hungary, Italy, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, and Spain belong to this group.
102 For more detailed information concerning this indicator see Thematic Report #2.

subsidy (DECHEZLEPRÊTRE ET AL., 2016). As a consequence, every country treats R&D investments more generously than capital investment, but the majority of OECD countries (and many developing countries) also have additional fiscal incentives such as enhanced deductions for R&D. Over the last two decades, these tax incentives have grown more popular compared to more direct R&D subsidies to firms[103]. But do R&D tax incentives actually work? The existing literature has several serious shortcomings that we seek to address briefly below. First, researchers have mainly focused on the effects of taxes on R&D whereas the point of the policy is to try and stimulate innovation[104]. The tax incentive could increase observed R&D without having much effect on innovation if, for example, firms re-labeled existing activities as R&D to take advantage of the tax credits or only expanded very low-quality R&D projects. We address this issue by analyzing the effect of R&D tax incentives not only on R&D expenditures but also on patenting activity (and other outcome measures such as firm size). A second problem with the literature it that it has proven difficult to come up with compelling causal designs to evaluate the impact of R&D tax policies. Evaluations at the macro-economic (e.g. BLOOM, GRIFFITH AND VAN REENEN, 2002; CORRADO ET AL., 2015) or state level (WILSON, 2009; MORETTI, WILSON, 2015) face the problem that changes of policies are likely to be coincident with many unobserved factors that may influence R&D. On the other hand, variation at the firm level is often limited as the tax rules apply to all firms and the heterogeneity in tax prices that does exist are driven by firm choices (e.g. R&D spending, tax exhaustion, etc.).

But which are the reasons for enterprises not providing training? As noted above, 70.5 % of EU-27 enterprises provided CVET (including courses and other forms) in 2015 and therefore 29.5 % did not (as shown in Table 2). The two main reasons given by enterprises in the EU-27 for not providing CVET related to recruitment strategies: more than half (53.4 %) of those enterprises not providing CVET did not do so because they tried to recruit people with the required skills while more than four fifths (81.2 %) said that the existing skills and competences of their workforce already corresponded to their needs. A lack of time and the high cost of CVET were the third and fourth most common reasons, given by around 3 in 10 enterprises not providing training (Table 9).

"Investing in CVET is both necessary and beneficial. Developing CVET is crucial for improving individuals' lifelong learning, promoting labour productivity and economic competitiveness in enterprises, and fostering economic growth and social inclusion and cohesion in Europe (EU 2020 strategy; Bruges communiqué; Council resolution on a renewed European agenda for adult learning; and communication from the Commission Rethinking education)" (CEDEFOP, 2015, op.cit., 98).

As briefly mentioned before, costs of CVET are very diverse. In its review of costs of adult learning, the EC- working group on financing adult learning suggested a comprehensive approach to identify the various aspects that could be considered to measure costs of learning (EUROPEAN COMMISSION, 2013, p. 30). Delivery costs, first, cover costs of infrastructure (buildings and equipment), training materials and staff. Subsistence costs are financed either by (part of) current wages/compensatory allowances or by learners themselves. Accompanying costs may also exist, when support such as childcare has to be provided to enable learners to participate. Employers' opportunity costs, can also be incurred, insofar as staff engaged in training (whether trainees or in-company trainers) are not (even temporarily) available for work. Also, to be considered are costs for training guidance services provided to learners[105]. Validation costs count as well. They can be direct (including both assessment and certification costs) or indirect (if staff whose competencies have been validated quit for an external job opportunity). Then come transaction costs, which refer

103 Typical results find marginal social rates of return to R&D between 30% and 50% compared to private returns between from 7% to 15% (Hall, Mairesse and Mohnen, 2010). Endogenous growth theories (Romer 1990, Aghion and Howitt 1992) provide several reasons why private innovative activities do not take into account externalities over producers and consumers, and produce less than optimal innovations and growth. For evidence showing R&D externalities, see for example Bloom, Schankerman, and Van Reenen (2013). There is also evidence that these spillovers are partially localized geographically, so the country where the R&D is performed obtains a disproportionate share of the productivity benefits, at least initially.

104 There is a large literature on the effects of public R&D grants on firm and industry outcomes such as Einiö (2014), González, Jamandreu and Pazó (2005), Goodridge et al. (2015), Jaffe and Lee (2015), Lach (2002), Moretti, Steinwender and Van Reenen (2015) and Takalo, Tanayama, Toivanen (2013). The earlier literature is surveyed in David, Hall and Toole (2000).

105 With reference to the so-called "healthy skills ecosystems" which also serve the purpose of encouraging and enabling individuals to engage in lifelong learning, the International Labour Organization notes that "Career guidance, information, advice and counselling allow individuals to understand training offer, available incentives, as well as their skills and preferences thus helping them to make successful training investments. From the standpoint of system financing, offering target groups adequate career guidance increases the efficacy of the targeting of incentives and overall efficiency by contributing to reduce deadweight loss. It also raises individual labour market outcomes, satisfaction and contributes to productivity gains via impacts of adequate training over skills matching and utilization in workplaces." (ILO, 2021)

to arranging the training action (cost of training managers' information, time and effort put into negotiating and contracting-out activities and going through the funding mechanism, cost of controlling implementation of the contract). Finally, there are quality assurance costs and public policy costs (policy-making, public administration and promotional actions). In practice, however, as also OECD and Cedefop note, data are lacking for measuring this full range of costs.

Several actors are involved in financing CVET. The EU, first, as in many countries, European programmes (mainly the European Social Fund - ESF. For a detailed analysis of this instrument see the second focus in Chapter 2) finance training projects. Governments, next, provide direct and indirect funding for CVET. Direct funding is through subsidies to beneficiaries (enterprises, individuals) and also through operating publicly owned CVET providers. Indirect funding is provided through tax legislation (for example deduction of training costs from income tax; VAT exemption). Enterprises, as employers or members of chambers or sectoral/umbrella organisations, finance CVET in several forms, either directly (paying training costs or operating training centres) or via training funds. Individuals, finally, whether employed, unemployed or inactive, also contribute, in particular when employees' training is not (or only partly) paid by the employer.

The question then is why these four categories of players are involved in financing, and whether they should be. For individuals, the most evident reason for participating in financing is the 'who benefits, pays' principle. By definition, individuals engage in CVET for their own professional development and career advancement, so the gain expected justifies bearing part of the investment cost. The same principle holds for employers. Employers finance and should finance CVET insofar as it is an investment from which they expect returns in terms of increased productivity, innovation, competitiveness and growth. The question however is whether employers' participation in funding CVET is a matter of free choice and should be left voluntary, or instead should be compulsory (and then regulated along lines set by public authorities and/or social dialogue). As noted by the European Commission's thematic working group mentioned above on financing adult learning, the problem with the voluntary approach is that it allows firms to poach trained staff without providing training, which undermines other employers' willingness to provide training, and finally generates risks of skills shortages. This can be avoided when employers' contributions (to sectoral or intersectoral training funds) are compulsory (EUROPEAN COMMISSION – thematic working group on financing adult learning, 2013, p. 35).

Should governments be involved in funding CVET? There is no single response to this. The departure point is that governments' interventions can hardly be neutral and, therefore, are likely to affect the training market (negatively and/or positively). Effects can be in terms of prices, entry of new operators, range of providers (wide or limited), profitability of the sector, ability of providers to develop innovative courses and forms of intervention, better access for certain categories of users (such as the disadvantaged), etc. Therefore, government intervention in funding makes sense if there is an orienting intention behind it. A classic example of where a government can decide to intervene is when private funding alone does not cover producing and acquiring the training quantity and content that would be most beneficial to society and the economy (the suboptimality argument). In such a case, government can intervene if it is commonly (or at least most often) agreed by society at large that governments have a responsibility in watching, regulating and orienting the economy. If governments (or more generally public authorities) decide to engage in funding, then the question is to whom the funds should be directed. Apart from operating by themselves through public agencies, public authorities have three major options. First, funding can be directed to the training sector, to lead training providers to shape their supply in accordance with policy priorities. Funding the providers has an advantage of relative simplicity as the counterparts to handle, negotiate and contract with are limited to a certain number of training institutions.

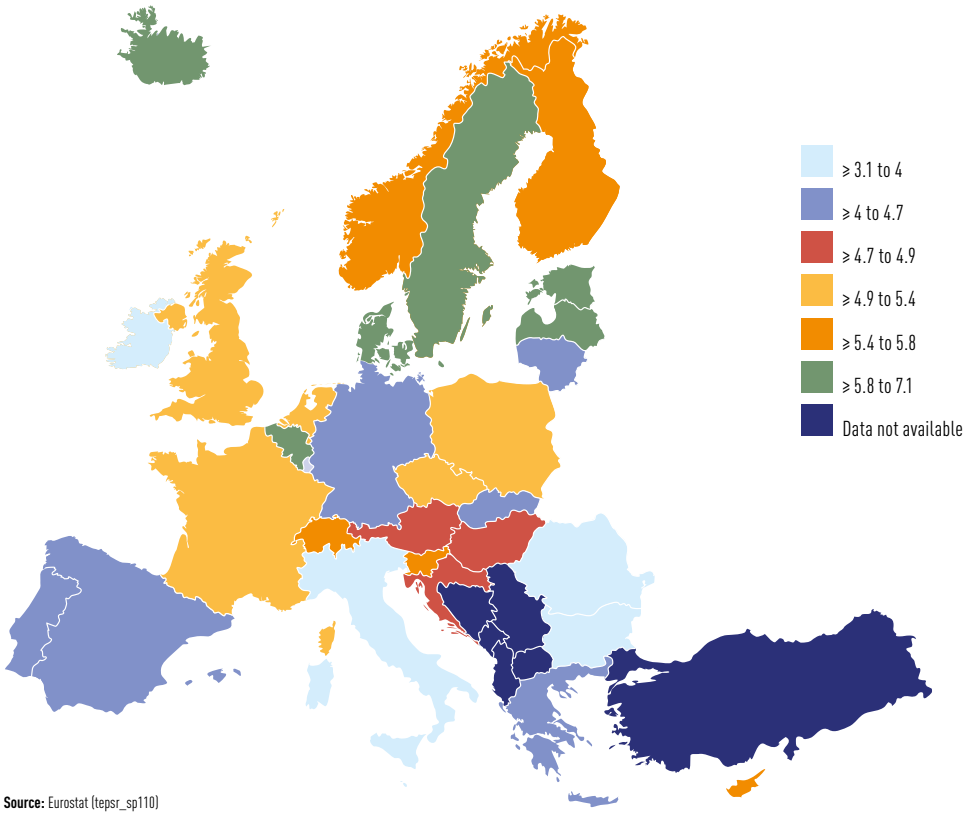
The second option is to fund employers. Employers will cooperate insofar as the opportunity offered to them is in line with their own organisational needs. This can limit the orienting power of public authorities, and at the same time generate dead weights in the sense that employers would have financed this training anyway as it corresponds to their business needs. The third option is to finance individual learners (through grants and vouchers). As for employers, engagement of individuals in offered opportunities and policy priorities will be mitigated by their own learning and career agendas. A deadweight effect is possible there too, though to a lesser extent as individual learners are more likely to lack the necessary financial resources and renounce learning in absence

of support (EUROPEAN COMMISSION – thematic working group on financing adult learning, 2013, pp. 34-35). Finally, should the EU be involved in funding CVET? The approach is similar to that of governments' involvement. EU intervention is grounded insofar as the Union is entitled to orientate countries' CVET policies and practices. An example is the ESF's operational programme 'human resource development' (OP HRD) in Bulgaria, which illustrates such an intervention with orienting intention. When CVET funding is based on European programmes, then local implementation more strongly reflects European policies (European Commission, 2013, p.27).

Funding instruments vary across countries. In 2014, Cedefop set up an online database where funding methods in use in each Member State can be monitored [106]. Cross-comparing Cedefop database with the OECD taxonomy for of financial incentives for steering education and training acquisition (OECD, 2017), some generic categories can be identified. Grants allow beneficiaries (learners or employers) to purchase CVET interventions directly. Tax incentives (such as reduction of personal or corporate income tax base or tax due) alleviate training cost for users. Levy grant (training funds) systems combine a levy paid by all employers in a sector or a geographic area with grants awarded to finance purchase of approved training. Levy grant systems allow training to be financed by all employers in the defined area or sector, not just those who train. Training leave allows workers to go on training during their working time. Vouchers, learning accounts and saving schemes entitle individuals to access specified learning activities, possibly from a range of approved providers. Loans enable individuals to access learning activities and repay later on. Section 4.2 illustrates more extensively different examples of funding instruments with national-level cases. Broadly speaking, "funding approaches are more effective when social partners are actively involved in the designing and implementation process; high-quality and widely accessible guidance and information services are provided to beneficiaries; the legal environment is favourable, stable and flexible; and the administrative burden is kept as light as possible" (CEDEFOP 2015, op.cit, 103).

4.1. General EU overview

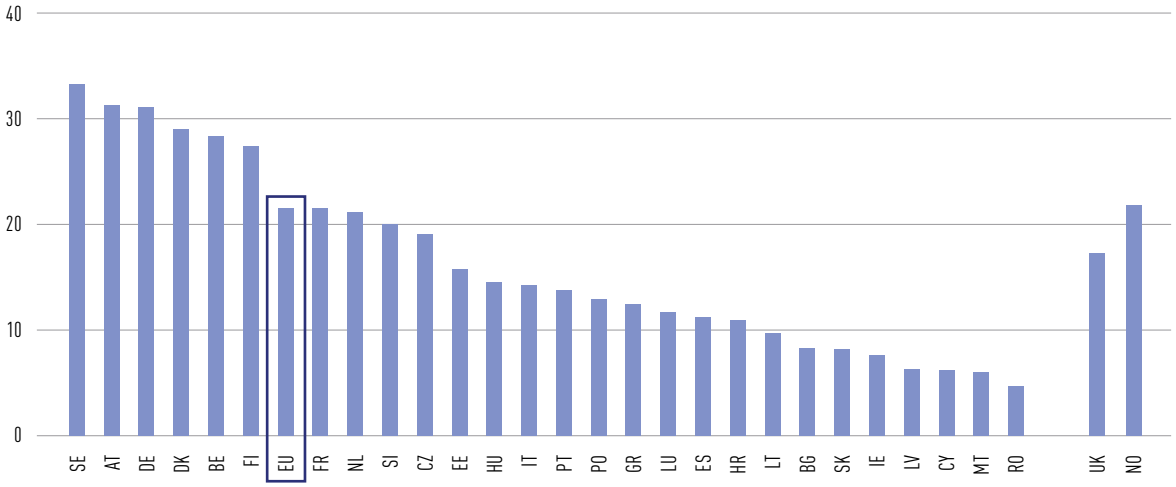
Figure 23: General government expenditure in education (2019)



Source: Eurostat (tepsr_sp110)

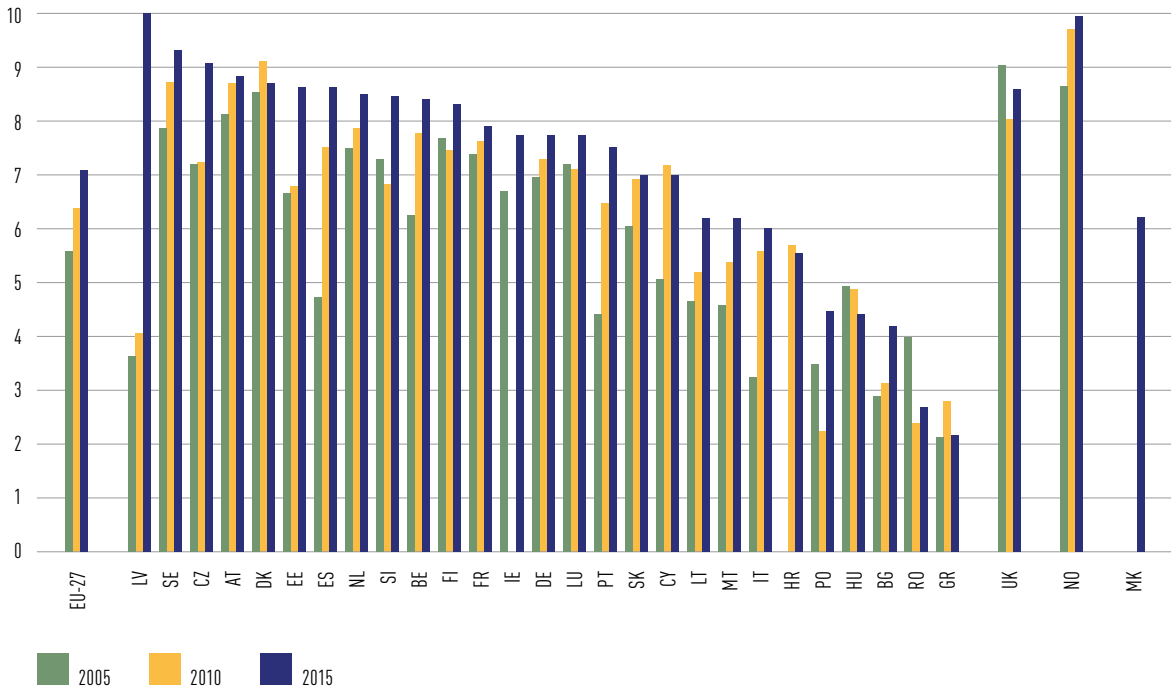
106 Cedefop, Financing adult learning web portal: http://www.cedefop.europa.eu/FinancingAdultLearning/.

Figure 24: R&D intensity in EU, R&D expenditure as % of GDP (2019)



Source: (rd_e_gerdtot)

Figure 25: Enterprises providing CVET, % of all enterprises (2005, 2010, 2015)



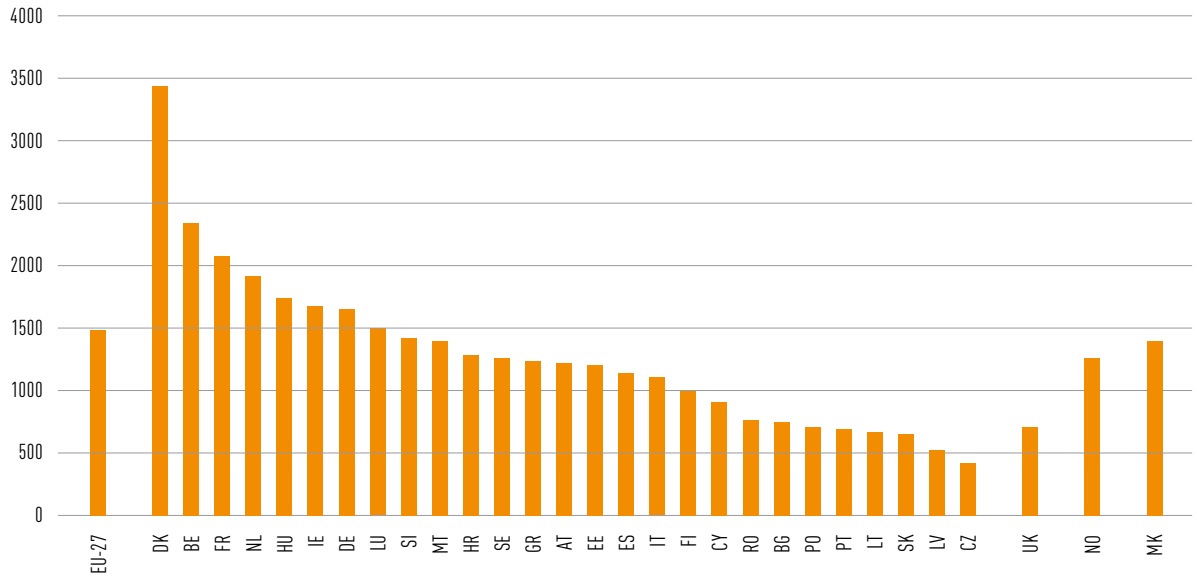
Source: (trng_cvt_01s)

Table 8: Enterprises providing training by type of training and NACE Rev. 2 activity and type of training, % of all enterprises (2015)

	NACE Rev. 2 activity						Type of training	
	All activities	Industry	Construction	Distributive trades and accomodation and food services	Information and communication services and financial and in-surance activites	Other services(*)	Proportion providing CVT courses	Proportion providing CVT other than courses
EU-27	**70,5**	**69,5**	**69,4**	**66,5**	**84,5**	**76,5**	**60,2**	**56,7**
Belgium	83,9	86,1	82,8	80,7	95,9	85,3	78,4	68,6
Bulgaria	42,2	41,8	47,4	36,1	61,2	50,1	31,9	37,3
Czechia	90,6	92,1	92,5	88,6	95,0	89,5	89,4	38,6
Denmark	86,6	82,6	83,2	83,7	92,2	94,1	69,9	74,4
Germany	77,3	79,9	72,8	75,4	92,4	76,5	61,9	73,7
Estonia	86,1	82,6	87,3	86,8	89,2	88,2	64,4	80,5
Ireland	77,4	75,9	74,3	73,2	89,8	84,3	57,1	74,3
Greece	21,7	23,5	18,1	18,9	41,8	25,2	12,7	18,0
Spain	86,0	87,2	89,7	84,4	93,0	85,0	80,6	64,4
France	78,9	81,5	66,4	76,4	86,2	86,1	75,1	47,9
Croatia	55,4	53,8	49,2	53,0	65,5	64,6	42,7	47,1
Italy	60,2	61,4	74,8	50,6	79,8	65,3	52,3	42,6
Cyprus	69,5	70,9	61,3	65,0	87,1	75,0	52,1	52,8
Latvia	99,9	99,9	100,0	99,9	99,4	100,0	31,3	99,9
Lithuania	61,6	60,4	58,6	57,5	71,5	73,0	43,7	55,3
Luxembourg	77,1	80,3	60,8	75,0	93,1	83,9	71,9	70,5
Hungary	43,8	47,1	46,1	38,6	65,3	43,1	32,1	37,3
Malta	61,6	55,7	41,7	51,4	86,1	81,6	43,3	58,4
Netherlands	85,0	85,0	86,4	83,8	88,1	85,4	75,5	76,4
Austria	88,1	88,6	87,4	85,4	94,9	92,3	81,6	79,5
Poland	44,7	45,5	39,0	39,2	67,2	56,0	29,2	40,6
Portugal	75,0	71,0	67,6	76,2	92,7	83,4	53,8	67,7
Romania	26,7	27,3	26,2	21,9	42,1	32,8	21,1	22,1
Slovenia	84,1	84,8	69,4	85,1	93,4	90,2	72,9	77,2
Slovakia	70,0	71,6	74,3	65,8	85,3	70,3	63,6	56,3
Finland	83,1	81,6	82,3	82,8	93,9	82,1	78,0	63,6
Sweden	93,1	91,9	91,4	91,2	97,1	96,6	81,6	86,7
United Kingdom	85,7	82,2	90,2	81,8	90,5	89,8	67,1	80,2
Norway	99,1	99,7	98,1	99,3	100,0	98,8	90,4	93,4
North Macedonia	61,9	63,6	54,4	58,4	77,2	69,7	45,9	38,9

Source: Eurostat (trng_cvt_01n2)

Figure 26: Cost [107] of CVET courses per participant, PPS (2015)



Source: (trng_cvt_19s)

107 The overall costs incurred by enterprises for the provision of CVET courses correspond to total monetary expenditure. This total is composed of direct costs, participants' labour costs and net contributions, where the latter is the balance between contributions to and receipts from training funds. In 2015, total training costs for EU-27 enterprises represented an average of 1.7 % of total labour costs; just over half of this figure (0.9 %) represented participants' labour costs, and most of the rest (0.7 %) was direct costs. Latvia was the only EU Member State where the cost of CVET courses in 2015 was less than 1.0 % of total labour costs (this situation was also recorded in North Macedonia; 0.5 %), while this ratio exceeded 2.0 % in Luxembourg, Malta, Ireland, the Netherlands, Belgium, France, Slovenia and Denmark. Source: Eurostat (op. cit.)

Table 9: Enterprises not providing CVET

	Proportion of enterprises not providing CVT	Proportion of enterprises not providing CVT that cited selected reasons for not providing CVT								
		High costs of CVT courses	Focus on IVT rather than on CVT	Major CVT efforts made in recent years	Existing qualifications, skills and competences corrresponded to the current needs of the enterprise	Lack of suitable CVT courses in the market	People recruited with the skills needed	Difficult to assess enterprise's training needs	High workload and limited/no time available for staff to participate in CVT	Other reasons
EU-27	29.5	29.0	24.7	13.0	81.2	12.9	53.4	15.0	31.7	17.1
Belgium	16.1	10.7	3.2	2.0	75.5	6.4	28.3	2.5	19.0	:
Bulgaria	57.8	42.7	21.7	9.5	81.2	21.5	82.8	15.0	39.5	6.7
Czechia	9.4	5.6	1.0	1.4	69.1	2.3	4.3	:	5.6	23.3
Denmark	13.4	22.0	44.0	4.5	73.9	19.5	65.3	38.1	41.9	16.4
Germany	22.7	23.3	47.1	13.9	87.7	12.2	53.2	23.3	32.4	21.8
Estonia	13.9	8.8	1.0	:	43.9	2.3	15.8	:	10.7	36.7
Ireland (1)	22.6	14.8	7.0	3.5	78.6	9.3	51.3	10.3	27.3	15.1
Greece	78.3	28.8	16.4	2.7	65.7	13.8	55.5	9.2	42.2	12.6
Spain	14.0	38.3	4.2	22.0	84.4	31.2	61.4	20.3	47.7	33.4
France	21.1	48.3	58.3	33.5	88.5	21.0	63.4	36.8	72.6	19.0
Croatia	44.6	14.1	4.2	2.2	79.2	7.0	34.5	6.2	12.1	11.6
Italy	39.8	13.3	8.5	12.1	74.3	6.0	15.4	4.9	14.5	17.1
Cyprus	30.5	19.8	7.4	8.7	78.2	13.8	59.7	3.8	34.2	3.3
Latvia	0.1	:	:	:	:	:	:	:	:	100.0
Lithuania	38.4	63.7	15.8	12.2	87.4	26.1	85.2	45.5	40.3	6.6
Luxembourg	22.9	6.0	4.2	:	70.1	3.5	22.3	:	16.1	15.3
Hungary	56.2	30.6	14.2	5.0	85.2	13.4	63.5	10.5	22.7	16.9
Malta	38.4	20.7	6.9	3.8	79.9	8.2	60.9	11.5	39.6	15.0
Netherlands	15.0	14.1	5.9	2.2	73.1	4.4	53.5	3.1	9.5	33.3
Austria	11.9	32.0	12.2	1.6	88.2	10.8	50.0	10.9	44.0	19.2
Poland	55.3	33.7	38.3	16.1	85.2	11.4	70.4	12.1	24.9	17.7
Portugal	25.0	46.3	22.3	7.9	76.5	30.3	64.1	30.6	40.5	40.4
Romania	73.3	34.0	5.4	5.6	83.5	8.0	78.3	6.7	26.1	1.5
Slovenia	15.9	31.3	11.9	30.0	92.0	10.1	64.1	5.5	20.8	13.0
Slovakia	30.0	30.6	22.9	15.0	74.2	8.9	48.1	7.9	30.2	12.2
Finland	16.9	39.9	36.1	5.1	89.3	14.4	66.2	17.5	48.7	16.4
Sweden	6.9	:	:	:	:	:	:	:	:	:
United Kingdom	14.3	19.1	23.3	13.6	88.7	19.4	73.2	30.8	35.7	10.8
Norway	0.9	44.6	:	:	100.0	:	30.0	:	2.9	:
North Macedonia (1)	38.1	26.8	8.6	2.8	47.2	10.2	28.1	7.7	20.4	17.9

(1) Low reliability
(:) Not available

Source: (trng_cvt_01n2) and (trng_cvt_02s)

4.2. Funding of adult education and training. A spotlight on different tools and national practices

In more detail, financial incentives could be further classified into supply and demand-side measures, with a subsequent breakdown of the latter into measures targeted at individuals and those targeted at employers. The first sub-section of the present chapter looks at supply-side measures. The second and third sub-sections focus on demand-side measures targeted at individuals and employers, respectively. And the final sub-section covers more comprehensive measures which seek to achieve concerted action between multiple stakeholders covering both the demand- and supply side[108]. The examples provided have been drafted starting from the information gathered via the interviews and the survey and complemented with desk research.

The most obvious way of lowering the cost of education and training and to incentivise individuals and employers to invest in them, is to provide public subsidies to education and training institutions. This is not just a very large subsidy for education and training acquisition, but it is also likely to dwarf any other types of financial incentives that governments use to steer skills development (and therefore limit their relative effectiveness). This is an important point, because it highlights the fact that financial incentives are, to a large extent, built into the existing system. Focusing on the adult learning perspective, obtaining information that is comparable across countries on the financing of adult learning is much more difficult, due to the diversity of the sector, its scattered nature, and also the fact that definitions of adult learning can vary significantly across countries. What is certain for the OECD, however, is that adult learning benefits considerably less from government subsidies (OECD, 2017, p.39). That being said, many countries do provide free courses to the employed and the unemployed/inactive for training in basic skills (see below for some examples), and short training courses are usually provided free of charge by the public employment service to jobseekers who need to improve their employability or who need to re-enter the labour market. In addition, and in the context of the future of work, there is a concern among policymakers that stronger incentives should be put in place for lifelong learning. This is one of the reasons why in the Netherlands, for example, the government has increased its spending on workforce training.

Governments can nevertheless use a range of financial incentives to try and steer the mix of provision:

PUBLIC SUBSIDIES

Sub-optimal quality and quantity of training may also result from the inability of training markets to balance the supply and demand for skills. Public expenditure in training is historically low in most countries (ILO, 2018), especially in continuing training and adult learning, with funding being mostly channeled to general/academic tracks[109]. While institutions may, ultimately, be free to decide what courses they provide, governments can heavily influence provision by targeting public subsidies at particular courses only. Several examples of this practice were identified[110]:

- In Latvia, the government provides a certain number of free study places in higher education each year, based on labour market forecasts and consultation with social partners and institutions. The government has been gradually increasing the number of publicly financed study places in STEM fields and cutting them in social sciences, and the plan is to have STEM courses

108 While this classification has been chosen to frame the discussion, it is important to stress that not all measures can be easily classified along these lines – in particular because measures which are designed to alter the behaviour on the supply-side often have knock-on effects on the demand-side, and vice versa.

109 Despite irregular availability, information from 107 countries (UIL, 2019) revealed that only a small share of public resources is allocated for adult learning activities: nineteen per cent of countries reported spending less than 0.5% of their education budget on adult learning education and a further 14% reported spending less than 1%. Only nineteen per cent of 107 countries reported spending more than 4% of the education budget on ALE.

110 A subtler alternative to funding student places on some courses of study only, is to allow the public subsidy to vary by field of study – for example by allocating more funding to courses that are deemed to be in high demand by employers or strategic from society's point of view. An important distinction should be made between arrangements where the public subsidy varies by field of study because of differences in cost, and those where the variation in public subsidy is deliberately designed as an incentive to encourage the provision of certain courses rather than others. Indeed, in many countries funding formulae acknowledge the different resource implications of providing certain programmes which arise from expensive teaching materials, higher salaries for specialist teachers, etc. These arrangements cannot be classified under the heading of "financial incentives" and therefore are not discussed further in what follows. That being said, it is important to point out that, even where subsidies vary purely based on cost considerations, this could have an implicit impact on the incentives for institutions, particularly where the subsidies are not an accurate reflection of the true costs of providing each type of course.

make up as much as 55% of all free study places by 2020 (EUROPEAN COMMISSION, 2015). This approach has been criticised, however, in that it reduces the incentives of institutions to become more labour market oriented, since the decision about which courses to provide is largely taken out of their hands (EUROPEAN COM-MISSION, 2015).

- Another example is Lithuania, where universities can apply for target funding to increase the number of study places in areas of national importance, but which are less popular among students. In the VET sector, institutions and individual employers may apply to the Ministry of Education and Science for funding to start a new programme in an area where there is a clear skills need (EUROPEAN COMMISSION, 2015)
- Even in countries where higher education institutions have a high degree of autonomy, governments sometimes fund particular courses in an attempt to address labour market needs. In Sweden, for example, the government has made some adjustments in the number of health care and engineering places in higher education (OECD, 2016).

Finally, it is worth noting that, while the discussion so far has generally focused on subsidies for longer education and training courses, governments also subsidise short-term training courses through their Public Employment Service. Indeed, where such training is not provided in-house, the Public Employ-ment Service will either provide vouchers or purchase such training from external training providers and, frequently, the courses procured will be in areas of high labour market demand. In Spain, for example, the Observatory of Occupations identifies those occupations where the demand for labour is high/growing and these are subsequently discussed in round tables with the State Foundation for Training for Employment, resulting in a list of high priority training needs. Training institutions only receive funding if their proposal includes at least 50% of learners being trained in priority training actions. Obviously, the use of subsidies to encourage institutions to provide certain types of courses assumes that the fundamental problem is a lack of provision and that, once this supply-side bottleneck is removed, sufficient demand exists for the courses that are being subsidised.

REGULATING THE START-UP OF PROGRAMMES

Governments can also steer the supply of education and training by regulating the start-up of new pro-grammes (and, indeed, the closing of existing ones). This can be seen as a financial incentive insofar as a programme's eligibility for public subsidies is conditional on its being approved. In many cases, such approval is carried out by education experts and based on an assessment of the anticipated learning outcomes, the quality of instruction (including the qualifications of the teaching staff and the adequacy of physical infrastructure and other resources available), as well as on the positioning of the new programme in relation to existing programmes (e.g. to avoid duplication)-. Increasingly, however, countries also require evidence that there is a labour market need for new programmes. One important question is whether labour market demand is best defined in terms of current or future needs. Relying on the current needs of employers may help in solving short-term skills shortages, but may not address the longer-term needs of the labour market, and could also lead to volatility in course provision. For example, in Sweden, Higher Vocational Education programmes are very responsive to labour market needs – but they are approved for a short period of time and disappear once the demand has been satisfied. Apart from resulting in very high transaction costs for providers and the government (who are involved in a constant process of approving and closing down courses), this also causes problems for students because there is no clear study route for those who would like to progress in their studies. On the other hand, funding places on the basis of forecast demand may also result in problems if there is no current need for such skills.

- Set up in the mid-1990s, and inspired by the demand for specific skills expressed by employers like Volvo, the aim of the Swedish model of Higher Vocational Education (Yrkeshögskolan, or Yh for short) was to provide a form of education that could respond to labour market needs, while at the same time deliver highly skilled professionals. Typical Yh programme length is between six months and two years. However, for a programme to result in a qualification upon graduation, it must have a minimum duration of one year. Employers are the main stakeholders in this model, and their involvement is four-pronged. First, employers work together with providers to trans-late specific skills needs into a programme proposal. Second, they back the funding application that the training institutions submit to government (Swedish National Agency for Higher Voca-tional

Education): no funding can be obtained without clear proof of employer demand. Third, once the programme is approved, each provider has to set up a steering committee for the programme, made up of employers, employer organisations, and trade unions. This steering committee is responsible for the implementation of the programme, including admissions, the syllabus, and quality assurance. Finally, nearly all programmes (except those of very short duration) contain a workplace learning component (Lärande i Arbete, or LIA), which is seen as one of the main success factors behind the Swedish model of Higher Vocational Education. The providers of Higher Vocational Education are autonomous in the sense that they decide which applications for courses to submit – although they need to abide by the rules set by the national agency. In practice, a wide range of organisations can provide HVE courses, including state higher education institutions, municipalities, county councils and private natural or legal persons. Importantly, there are no requirements for staff to have formal teaching qualifications, which allows practitioners to teach. Source: interviews' feedback and TOMASZEWSKI, 2012.

TUITION FEES

Considering the completion of tertiary education study paths as one of the framework conditions captures the main drivers of innovation performance external to the firm, a brief reference should be made to the tuition fees issue . In most countries, education and training providers are not entirely free to set the level of tuition fees. In Europe, for example, universities are free to set tuition fees in only four countries (Estonia, Hungary, Latvia and Luxembourg). In the other countries where tuition fees are charged, the level of tuition fees is either: i) set jointly by universities and an external authority (Switzerland); or ii) set by universities under a ceiling set by an external authority (Flanders, Italy, Lithuania, Germany (North RhineWestphalia, Portugal and the United Kingdom); or iii) entirely set by an external authority (Austria, France, the Netherlands, Spain).

The previous section focused on supply-side measures – i.e. interventions targeted on education and training institutions that are designed to influence the mix of provision. The present section turns to the demand-side, starting with measures that are targeted at individuals. While there are many reasons why individuals invest in education and training, an important motivation is the expected return in terms of higher future earnings in the labour market. Those returns can be modified by government through the use of financial incentives to try and change the behaviour of individuals. Traditionally, such measures have been concerned primarily with getting individuals to invest more in education and training, regardless of the type of skills that are acquired. The tools that governments have at their disposal to try and achieve that goal include: subsidies, savings or asset building mechanisms, tax measures, subsidised loans, time accounts and training leave entitlements.

SUBSIDIES

Subsidies are the most direct, as well as a highly flexible, way of providing financial incentives to individuals to invest in education and training. They include: scholarships, grants, bursaries, allowances, vouchers, training cheques, credits, etc. and come in many shapes and sizes – which makes them difficult to classify. In general terms it is possible to distinguish between subsidies on the basis of their target population, on the one hand, and the type of skills gap they seek to address, on the other. So subsidies can either target students in initial education, the employed, or the unemployed/inactive; and the skills promoted can either be basic, transversal or specialist. The discussion that follows focuses on the latter type of skills. The classification of incentives proposed here helps to structure the discussion that follows, but it is necessarily schematic. Not all subsidies can be neatly classified into one of the abovementioned categories. For example, several countries have programmes in place that are open to both the employed and the unemployed/inactive (although the generosity of the subsidy may still vary to reflect the relative disadvantage of each group). Examples of such programmes include: the Cheque Formação in Portugal; de Tijdelijke regeling subsidie schooling richting een kansberoep in the Netherlands and the Bildungsgutschein der Arbeiterkammer in Austria. In addition, subsidies vary substantially along a large number of other dimensions, including: their generosity (level of subsidy and length for which they are awarded), eligibility rules, the type of expenditures covered, the modalities of payment, etc.

An important trade-off in the design of subsidy schemes is between, on the one hand, simplicity (and therefore lower administration costs, but possibly higher economic losses) and, on the other hand, greater targeting (which increases administration costs and possibly reduces take-up, but also cuts deadweight loss) (OOSTERBEEK, 2013 [111]).

- Schemes that are less targeted have tended to disproportionately benefit the high-skilled and, therefore, resulted in high deadweight loss. For example, in the case of the Training Cheques in Flanders (Belgium), almost half of the beneficiaries were highly qualified employees, while middle- and low-skilled people were underrepresented. As a result, the Training Cheques were reformed in 2015 and access was restricted to the low- and middle-skilled (and the system is currently undergoing further reforms).
- In Estonia, the training vouchers made available over the period 2009-10 were used primarily by highly educated unemployed persons because they funded upskilling rather than retraining courses. This observation led to a reform of the vouchers in 2011 which allowed them to be used for retraining as well.

SUBSIDIES FOR THE EMPLOYED

Subsidies for training existing employees are most often paid to employers, and not to the employees directly. This is because employers usually have a good sense of their skills needs and subsidies are designed to help them overcome barriers that prevent them from investing in those skills. In certain circumstances, however, it makes more sense to target the subsidy directly at the employee. In particular, many low-skilled workers receive little training and are stuck in poor quality jobs with low earnings, little job security and poor career prospects. By targeting training directly at such workers, governments can help them increase their chances of retaining their existing job and/or moving to a higher quality one. For this reason, such programmes are sometimes referred to as "retention and advancement" services. In countries where these programmes operate, they often target skills and/or occupations in high demand in the labour market.

- In Germany, workers without qualifications and workers who have spent at least four years working in a job unrelated to their initial training (Berufsentfremdung or "professional alienation") may receive funds from the government to retrain in an area with good labour market prospects.
- In Finland, adults with no vocational qualifications are exempted from paying fees for education and training that lead to competence-based qualifications (EUROPEAN COMMISSION/EACEA/EURYDICE, 2013).

SUBSIDIES FOR THE UNEMPLOYED/INACTIVE

Labour market training for the unemployed/inactive plays a critical role in matching labour demand and supply by ensuring that the unemployed/inactive are given the skills that are needed by employers. This requires good labour market intelligence (including forecasts). In terms of incentives, labour market training for the unemployed/inactive is usually provided free of charge while individuals continue to receive unemployment (or equivalent) benefits – but the duration of such programmes is often limited: six months in Sweden, and up to three years (with average weekly hours of 20 or more) in the case of the Fachkräftestipendium (Skilled Workers' Grant) in Austria. Sometimes, additional funding is made available to cover travel and other costs associated with attending training programmes. For example, the Austria Beihilfe zu den Kurs- und Kursnebenkosten (Allowance for Course and Course-related Costs) covers not only 100% of the course costs, but also 100% of course-related costs, such as medical or psychological assessments, examination fees, special clothes, commuting expenses, board and lodging, as well as sign language

111 The Author estimated that one additional euro of training expenditures costs approximately three euros of taxpayers' money. To reduce deadweight loss, many subsidy schemes are targeted on the low-skilled and the disadvantaged, as in the example of Flanders given above. However, if individuals are unfamiliar with training, even targeting subsidies might not help unless such aid is accompanied by other interventions such as information, advice and guidance – an issue that will be discussed in more depth in the final Comparative Report. When the objective is to steer education and training decisions, it is also not clear whether there is any particular value in targeting financial incentives at vulnerable groups.

interpretation. In some countries, the term "financial incentive" may be less meaningful because benefits recipients are obliged to participate in education and training within a mutual-obligation principle.

SAVINGS AND ASSET BUILDING MECHANISMS

Individual Learning Accounts

While the subsidies discussed so far provide incentives for individuals to participate in education and training immediately, there are also subsidies that encourage such participation in the future. The best-known among such schemes is the individual learning account (ILA), which emerged in the late 1990s as an alternative to traditional subsidy schemes. ILAs are (tax-sheltered) savings accounts that can be opened by individuals for the purpose of funding future learning activities. The philosophy underlying these initiatives is similar to those of vouchers – i.e. to "empower" individuals in education and training markets by encouraging them to take responsibility for their own education and training choices. However, they also have a secondary objective, which is to involve other stakeholders in the process. Indeed, third parties (e.g. the government and employers) may often also contribute to the account – although individuals generally retain freedom of choice concerning the type and timing of training, training provider and amount invested. Before analysing examples of national best practice, a closer look should be taken at the concept of individual learning accounts, as it is important to distinguish between the different types of individual schemes in order to choose the most suitable approach for targeted policy objectives [112].Furthermore, an analysis only of the (rare) examples of ILAs would be restrictive, as it would deprive us of the best practice or lessons drawn in the field of adult learning from other types of scheme. Indeed, the OECD takes a wider approach by looking at individual learning schemes (ILSs) rather than just ILAs [113]. In addition to ILAs, ILSs include individual savings accounts (ISAs) and vouchers. In the next paragraphs, we provide some known examples of ILSs, in the European Union and beyond, and highlight some best practice for each [114].

Table 3: Individual learning Schemes

Individual savings accounts	Training Vouchers	Individual learning accounts
Allow users to deposit and accumulate money regularly onto a real, physical account, to be used for training purposes. The saving process is supported by the state, for instance through tax reduction or via a matching system.	Support those taking part in further training through direct governmental payment of money. They often require more or less co-financing from the user and do not allow for any accumulation of rights or resources over time.	Are virtual, individual accounts in which training rights are accumulated over time. Publicly financed, they are virtual in the sense that resources are only mobilised if training is actually undertaken.

Source: ADAPT elaboration on OECD 2017 and 2019

112 CEDEFOP (2008), Promoting choice, responsibility and participation in training: individual learning accounts, Briefing note, July

113 OECD (2019), Individual Learning Accounts: Panacea or Pandora's Box?.

114 For the purposes of the present report (European perspective) ISAs will not inform chapter 2 in terms of examples, since scientific literature identify the United States system as the most relevant one. Individual savings accounts, sometimes considered the first generation of ILSs, allow users to deposit and accumulate money regularly onto a real, physical account, to be used for training purposes. The saving process is supported by the state, for instance through tax reduction or via a matching system. Cedefop (2009), Individual learning accounts, Cedefop Panorama series, No 163, p. 12. In practice these schemes are extremely rare. We have to look beyond the European borders to find meaningful experiences of individual savings accounts, and both are no longer in place. In the United States, Lifelong Learning Accounts (LiLAs) ran between 2001 and 2007 as several small-scale initiatives in Chicago, San Francisco, Michigan, Maine, Washington and Kansas City. LiLAs were portable, individual accounts that financed workers' training and were available to all workers on a voluntary basis. Individuals' contributions were matched by employers up to $2,500 a year, so $5,000 in total. Tax incentives were also added for low-income individuals and companies (especially SMEs) to promote the scheme. Participants chose training courses according to their career goals and a learning plan was developed with educational and career advisers (Cedefop, op.cit., 103).

Training vouchers *"support those taking part in further training through direct governmental payment of money"*[115]. They often require more or less co-financing from the user and do not allow for any accumulation of rights or resources over time[116]. As the OECD points out, while many adult learning schemes are called 'individual learning accounts', or a variation of this, most are in fact training vouchers in their design[117].

It should be noted that the term ILA has been reinterpreted over the 10 years since its origination. Thus, the definitions presented in this report must be traced back to current national experiences and read in light of the fact that there is the possibility of overlap between different types of subsidies and financial incentives underlying the disbursement of this type of instrument on an individual basis. For example, in France, training funds contribute to supporting various instruments with different goals and approaches (e.g. supporting re-/upskilling), subsidies for fees, wage subsidies and also funding for Individual learning accounts (ILA) (CEDEFOP, database on financing CVET/AL -EU27+ UK, 2020 edition, on-going update).

In the EU, most of the individual learning schemes that have been implemented in member states are voucher schemes[118]. Here, we consider the following member states: Germany, Austria, Portugal, Belgium and Italy - that have implemented this type of scheme.

- The Bildungskonto was introduced in Upper Austria in 1994 and is still running today. The scheme offers bonuses and discounts for adult learners. In a standard case, it covers 30% of training fees up to a maximum of €2000, while for several target groups the support granted has risen to 60% up to €2,400[119]. At first, the scheme was only available for low-skilled individuals, but it now includes new target groups such as the self-employed and immigrants[120]. A specificity of the scheme is that application is made after completion of the training. This may partly explain the failure of the scheme to reach the least educated workers despite the higher subsidy rates. However, this co-financing obstacle can be overcome if learners combine the voucher scheme with the training leave that exists in Upper Austria (Bildungskarenz) and that is currently underused, possibly due to insufficient information and guidance. Regarding the content of training, quality issues have been addressed well since the launch of the scheme (ISO certifications), and additional quality frameworks have been put in place effectively over time – at both regional (Qualitätsgütesiegel) and national level (Ö-Cert). The Chamber of Labour cooperates with the regional government locally in establishing people's eligibility, and plays an important role in informing and guiding people.

- Since 2003, the Flemish government in Belgium has supported the participation of adults in training and education by contributing to direct training costs through training and guidance vouchers, called opleidingscheques. Employees (including temporary workers) can buy training vouchers up to an annual amount of €250 to cover training and related costs. The vouchers can thus be used to cover the direct costs related to training, career guidance or skill assessment services, but cannot be used to replace training costs for the employer (and therefore the training course has to take place outside working hours)[121]. Half the costs are paid by the government (through the Flemish public employment service) and the rest are at the expense of the learner. Additional funding to cover the full training costs is possible – up to €500 each year – for certain 'at-risk' groups such as employees without higher and/or secondary education, those with a migrant background or with a disability, and older workers. However, in practice, the scheme has been most used by young people who already have high qualification levels, rather than by the at-risk groups. In addition, a significant issue that arose from our analysis was the extensive use of the vouchers (60%) to finance training courses that did not provide value added on the labour market – for example, leisure training (such

115 Cedefop, op.cit., 14.
116 OECD, op cit, p. 7.
117 Ibid, p. 9.
118 Ibid p.7.
119 Land Oberösterreich, Bildungskonto.
120 OECD, op cit, p. 13.
121 Euréval (2012), Étude comparée sur le développement des dispositifs individuels dans les politiques de l'emploi. Centre d'Analyse Stratégique, p.17

as cooking classes) with no link to the individual's present or envisaged career [122]. Stricter rules on the use of the scheme were, therefore, put in place in 2010, stipulating that training courses would have to be linked to the needs of the labour market, which reduced the number of vouchers granted. Furthermore, opleidingscheques can be combined with paid educational leave, a right negotiated by the social partners for employees to take up to 125 hours of training per year for programmes linked to occupations with labour shortages, and during which the employee will continue to receive his/her wages up to a ceiling [123].

- In Italy, the individual learning credit card project was launched in 2005 by the joint actions of three regions (Piedmont, Tuscany and Umbria) with the Ministry of Labour, and lasted until 2015. Co-financed by the ESF [124], the Tuscan Carta ILA was available for jobseekers and specific population groups: it put a priority on low-skilled jobseekers, but also employees in non-standard contracts, women returning to work, immigrants, the armed forces and transgender people [125]. The card was initially issued with €500 and could have up to four further payments (€2,500 in total). It not only covered training costs, but also all expenses associated with training such as travel, subsistence, housing, and even childcare costs [126]. Individuals could participate only if they were supported by a public employment services (PES) counsellor to develop a training project and an employment plan. At first, in order to attract individuals who might have been reluctant to return to formal classroom-based education, the Tuscan Carta ILA allowed informal training [127]. However, this changed in 2007 as some incidents of fraud materialised and governments had to reclaim funds. Eligibility was then restricted to certified training institutions and programmes being part of a regional training list.

- Bildungsprämie is one of the three components of the federal "Lernen im Lebenslauf" (lifelong learning) initiative launched in Germany in 2008, and is co-financed by the European Social Fund (ESF) [128]. This voucher scheme covers 50% of training costs, up to €500 and targets low income adults (employed, self-employed or on maternity/ parental leave). To be eligible for the scheme, training must fulfil quality requirements, often based on the provider (or part of its educational offer) being certified according to a recognised quality framework. Training that used to be financed by employers or for which the employer should be responsible is not covered. Results show that although the scheme is successful in reducing barriers to training in terms of cost, it is not able to remove other kinds of barrier, such as insufficient prior education or a lack of motivation/interest to train – which is reflected in the use of the programme by those already educated and inclined to train [129]. Very low levels of acceptance of the scheme can also be observed among small and very small training providers due to the administrative burden that the scheme incurs. The scheme receives good feedback regarding personal counselling: participants are requested to attend an information session, and also have to meet a counsellor, but they can do so only once.

- In August 2015, Portugal introduced a training subsidy for both employees and job seekers, Cheque Formação, with the aim of supporting the acquisition of relevant skills for the labour market. Through this scheme, employees wishing to invest in training, can receive a subsidy of €175 – to cover up to 50 hours of training – while jobseekers can engage in a maximum of 150 hours of training with a maximum amount of €500 [130]. However, the limited support makes it unlikely that the programme will lead to a significant upskilling or reskilling of the workforce. Unlike the other schemes examined here, funds can be taken up either by individuals, or by firms for their employees. The latter represents the overwhelming majority of cases, most often as a means to cover their short-term needs. Together with the government, the public employment service establishes labour

122 Euréval, op.cit., 40.
123 OECD, op cit, p. 39.
124 EUROPEAN COMMISSION (2015), Individual Learning Account (ILA), Giving unemployed individuals access to Lifelong Learning, Information review, October.
125 Cedefop, Op cit, p. 84.
126 OECD, Op cit, p. 20.
127 This was seen as especially important since a survey on the beneficiaries' prior attitudes to training showed that the decision to not train was based on many different factors, including fear of going back to school (16.1%) and a belief that training, based on previous experiences, is not suited to their own needs (20.1%). Source: European Commission, Op cit.
128 Euréval, Op cit, p. 17.
129 Kantar (2019), Evaluation des Bundesprogramms Bildungsprämie (BIP) Endbericht, Munich, May, p. 15.
130 Araújo, S. (2017), Raising skills in Portugal, OECD Economics Department Working Papers, No. 1405, p. 13.

market training priorities that training programmes must match in order to be covered by the scheme. The alignment of training programmes with labour market priorities and the success in addressing firms' more immediate training needs constitute the scheme's strong points. The scheme is complemented by another programme, Qualifica, featuring Qualifica Centres that provide guidance as well as the recognition, validation and certification of skills free of charge, with special help for low-skilled individuals.

Individual learning accounts are "virtual, individual accounts in which training rights are accumulated over time. Publicly financed, they are virtual in the sense that resources are only mobilised if training is actually undertaken" (see, Table 3).

- In the EU, only France has implemented, since 2015, what is often described as a fully-fledged individual learning account [131]. The Compte Personnel de Formation (CPF) thus attaches training rights to individuals, regardless of their status [132]. This allows for transferability of training entitlements across jobs and status on the labour market. Workers are credited with an amount in euros, depending on hours worked. Those who work at least 50% of the statutory working time benefit from €500 a year with a €5,000 ceiling, but targeted support is also available for low-qualified adults and those with a disability, who receive €800 a year, up to €8,000. Additional funding from public employment services, regional authorities, the employer and other entities can top up the account. The entitlement to training is enhanced by an improved Career Transition Counselling Service (CEP), Conseil en evolution professionnelle. Actions to validate acquired experience, skills assessments, support and advice for entrepreneurship, as well as distance learning are eligible [133]. The CPF is financed by a part of the annual compulsory contribution by companies for vocational training, which is managed by the Caissevdes Dépôts et Consignations. France's recovery plan for the Covid-19 crisis provides that accounts of young people in need of basic digital skills training be topped up to entirely cover the fees of digital training courses. Lastly, the CPF relies on a single digital account – accessible through a website and application [134] – through which learners can see their training rights and enroll directly on a listed CPF-funded training course. A peer review system, which allows learners to rate the quality of training courses, is also due to be made available by the end of the year. On top of very strict controls of the 15,000 training providers, this additional rating system will also enable a training provider to be removed from the list should assessments from learners show this to be necessary.

- Other EU member states have recently started considering the establishment of individual learning accounts. The Netherlands, for example, has plans for an individual learning account and development budget (STAP budget [135]), and Slovakia has developed a national skills strategy with the OECD to improve adult learning that includes the roll-out of individual learning accounts in the country [136].

131 With reference to the French case and the opportunity to include it in the list of prominent examples for the purposes of this report, for the International Labour Organization, "A healthy skills ecosystem must therefore enable individuals to establish and follow individual career and learning pathways and make sense of their experiences. An important building block of LLL systems is the existence of clear skills frameworks for occupations and qualifications alongside well established systems for the recognition and validation of learning. These allow an individual's learning experiences to be recorded and recognised, making the creation of individual portfolios possible and creating the possibility of referrals across guidance and training providers, social security services, employment centres and enterprises. Financing strategies targeting individuals need to be based on medium to long term career planning monitoring and case management, as for example happens with the French individual learning account." (ILO, 2021).

132 As of September 2020, 12 million people had activated their online account, about one third of the eligible population (37.2 million). OECD (2017) categorizes the CPF within the "Time accounts" category. In more detail, time accounts foresee a mechanism which allows individuals to save up time (rather than money) for training purposes. Through such accounts, individuals can accumulate time (occasionally linked to overtime hours or foregone bonus payments, though not necessarily) which they can subsequently use for paid time off to participate in training. Time accounts can be attractive to employers because they allow them to avoid paying high rates for supplementary hours, as well as to avoid having redundant personnel during slack times. For employees, a particular advantage of such schemes is that they help overcome time constraints (and the high cost of foregone earnings) – which are often one of the primary obstacles to employees engaging in training.

133 Distance learning and on-the-job training have also been included since the 2019 reform of the scheme. The training offered is wide-ranging, with 15,000 eligible training providers offering 4,860 training courses resulting in certification. In total this represents 1 million sessions, including 420,000 online sessions.

134 See, Mon compte formation website.

135 See, STAP budget website.

136 European Commission (2019), Education and training monitor – Slovakia, p. 10.

> In August 2021 a tripartite opinion of the EU Advisory Committee on Vocational Training has been adopted on the subject of individual learning accounts (ILAs) and strengthening training provision in Europe [137]. This opinion sets out the joint priorities of the social partners and Member States for how the Commission could develop a policy proposal to strengthen training provision across the EU. This opinion was prepared ahead of the anticipated Commission proposal for a Council Recommedation on ILAs, which is expected by the end of 2021. The opinion highlights that across Europe, social partners, social dialogue and collective bargaining play the key role in facilitating employees' effective access to training in different ways in each country and that ILAs are just one of several options for financing training. The opinion also emphasises that ILAs should not replace existing employer or government funded and/or social partner driven approaches to training as well as other forms and modalities of training financing. Continuous dialogue between the workforce and their management at company level has an important role to facilitate the choice of training activities, as does collective bargaining at sectoral and/or cross-industry levels, including the widespread practice of training funds across Europe. Improving incentives to training provision across Europe is an important priority for the rolling out of recovery and resilience plans in the coming years.

Tax incentives

Governments widely use tax incentives to incentivise individuals to invest more in education and training, and these come in various forms: tax allowances (i.e. deductions from taxable income); tax credits (sums deducted from the tax due); tax relief (lower or zero rates) on scholarship incomes, grants and student income; and tax deductibility of interest payments on student debt. Several European countries have set up tax incentives to foster national education and training activities. The need to provide continuing training for the workforce has led to several cost-sharing (co-financing) schemes across Europe, including tax incentives, loans, training funds, and individual learning accounts. Therefore, tax policy has been incorporated into some initiatives to enhance incentives and means for financing lifelong learning [138].

> This example (Austria) describes two incentive schemes which introduced tax deductions and credits for enterprise training, in 2000 and 2002 respectively. The schemes rewarded and encouraged enterprises investing in employee training, and operated at federal level until 2016. The tax deductions were specifically for enterprise-based training, rather than apprenticeships or individual training, as there are other incentives for apprentice recruitment as part of a larger public policy package. The incentives intended to benefit enterprises for training pursued as part of day-to-day business and operated through the corporate tax system. The schemes were evaluated and, whilst they were discontinued in 2016, can be traced from their introduction to the decision to discontinue them. It is important to note that, although the schemes were not replaced at federal level, each regional government operates its own schemes for enterprise-based training through agreements with social partners [139]. At federal level, training expenses are treated like any other business expense in the annual assessment for corporate income tax. They are deemed deductible if the training measures are "in the interest of the business [140]". There are no upper limits for the deduction. The deductions were supplemented by additional incentives in 2000 [141] and 2002 [142] through the Tax Allowance for Training and the Training Tax Credit. These aimed to increase employees' continuing vocational education and training (CVET) but were discontinued in 2016 [143] because they did not trigger sufficient additional investment and provided 'deadweight' windfall gains to enterprises. The Federation of Austrian Industry first proposed the measures, and successfully campaigned for the tax law to be amended. The campaign was supported by the Austrian Economic Chamber, Austria's employers' organisation, which also proposed increasing the tax allowance to 40% for small enterprises (less than 20 employees), as well as for special

137 Advisory Committee on Vocational Training (2021), Opinion on an EU initiative on ILAs and strengthening training provision in Europe. Press release available at <https://ec.europa.eu/social/main.jsp?langId=en&catId=1223&furtherNews=yes&newsId=10081>.
138 Cedefop (2009), Using tax incentives to promote education and training.
139 Austrian Chamber of Commerce https://bildungsfoerderung.bic.at/foerderungen.
140 Training delivered in the interests of an employee is regarded as in-kind payment
141 Introduced by the Tax Reform Act 2000 (Federal Law Gazette Part1, No. 106/1999). Source: ETF (2018), Support to VET Financing Policy guidance note: Financial incentives for companies.
142 Increase to the tax allowance and introduction of the tax credit through the Economic Recovery Act (Federal Law Gazette, Part 1, No 68/2002).
143 Tax Reform Act 2015/16 (Federal Law Gazette Part 1, No.118/2015).

target groups such as older workers. Training tax allowance. A 9% additional tax allowance was introduced in 2000 for external training activities. It was increased to 20% in 2002 and extended to in-company training. The target group was all company employees irrespective of position, age, specific training needs, etc. The incentive took the form of an extra deduction from taxable profits, with not only the actual training expenses deducted from taxable income, but also an extra 20%. For example, a training expense of € 1,000 attracted an additional deduction of € 200 from the company's taxable income. The financial benefit was the marginal tax rate saved on the € 200. Training tax credit. This was introduced in 2002, at the same time as the tax allowance was increased, to encompass enterprises with low profits unable to take full advantage of the allowance. It was a tax credit of 6% of the actual training expenses. Companies that did not make enough profit to benefit from the 120% tax allowance could claim the 6% credit. The credit had to be claimed within the employer's tax return and was deducted from their tax liability[144].

Loans

One of the main sources of market failure in the skills market stems from the difficulty individuals face in financing their education and training through borrowing. Governments can and do therefore intervene by putting in place a range of measures – such as state guarantees, interest rate subsidies, loan guarantees, income-contingent repayments, student loan remission and/or forgiveness – to address the reluctance of private financial institutions to provide loans for education or training purposes but also the risk averseness of certain learners (particularly those on lower incomes) (OECD, 2017).

It has been argued by some that loans are a particularly cost-efficient way of financing investments in skills, as they allow available public resources to be spread further. If all the money that was spent on subsidies like grants and scholarships were used instead to guarantee or subsidise loans, proponents of loans believe that aid would be available to more students and investment in skills would increase. A second argument in favour[145] of loans is that they shift some of the cost of education and training to those who benefit the most, namely individuals. Given the recent crisis and tightening of public finances, many countries are shifting their student support systems from grants to loans. Some examples of where this has happened include Finland, Sweden and the United Kingdom.

Study/Training leave

Giving employees a right to study leave (and guaranteeing the right to return to their job after completing the training course) sends an important message about training, and in most countries such rights are either enshrined in national legislation or defined in collective agreements between employers and employees. Under most of these arrangements, employees are also protected from dismissal and retain their entitlement to health insurance and pensions rights while on study leave (CEDEFOP, 2012). While the right to study leave signals the importance of training to employers and employees, it does not solve the problem of how the costs of training are going to be covered – in particular the income of the employee while he/she is attending the training course and/or the cost of a replacement worker. Indeed, this may be one of the reasons why the ILO Paid Educational Leave Convention 1974 (No. 140) has received a relatively low number of ratifications (GASSKOV, 2001) and why uptake of training leave is frequently quite low in OECD countries (STONE, 2012).

144 In short, the incentive allowed companies not only to deduct the actual cost of training as a business expense from their taxable income, but also to deduct an additional 20%. The tax base was diminished by 120% of the actual expense, which in turn resulted in a lower tax liability. Companies which did not make enough profit to benefit from such a tax deduction could claim a credit for training expenses of 6% of the actual expense, which was deducted from the tax liability. The main goals of these incentives were to promote companies' investment in human resources to increase national and international competitiveness of Austrian companies, and foster equal treatment of human and financial capital.

145 But loans also have their weaknesses. In particular, it has been argued that loans are less effective than grants in encouraging individuals on low incomes to invest in education and training, in part because of their higher debt averseness. Also, loans systems often require a developed and expensive infrastructure for providing support to borrowers, as well as for administration and servicing – and this could significantly lower the alleged efficiency of loans as a tool for financing skills acquisition. Finally, high level of student debt may have adverse effects both for students and for governments, if large numbers of students are unable to repay their loans.

There are several ways in which study leave arrangements can be used for steering skills acquisition. Belgium, for example, provides longer study leave for individuals who (re)train in areas where labour market shortages exist (métier en pénurie/knelpuntberoep). In Austria, training choices need to be approved by the PES, which should only be done if the course is likely to improve the labour market prospects of the individual in question; "hobby courses" are not financed. In Norway, the studies undertaken must be vocational. In countries where study leave is regulated by collective agreement (e.g. the Netherlands), training priorities are likely to reflect those set down by the social partners. Finally, some governments (e.g. Hungary, Iceland, Lichtenstein, Latvia and Portugal) make training leave compulsory for certain professions, e.g. teachers, social care, or health care specialists [146].

In Luxembourg, workers may take a training leave of a maximum of 20 days within 2 years (80 days over the entire employment career) [147]. The training programme does not necessarily have to be directly related to the individual's occupation. The State provides individual with wage compensation for each day off which is equal to the beneficiary's average daily wage. This also applies to self-employed workers.

It is important to mention that study leave arrangements are often closely related to other mechanisms designed to encourage investments in education and training – such as collective training funds (see the focus below) to promote cost sharing and payback clauses which guarantee that employers recover at least part of their investment in training in the event that the trained employee leaves soon afterwards. The take-up of study leave may also be combined with part-time work, to ensure that the costs of training are being shared between employers and employee.

DEMAND-SIDE MEASURES: INCENTIVES FOR EMPLOYERS

This third sub-section turns towards demand-side measures focused on employers. The reasons why employers invest in training include: greater employee loyalty, and therefore lower labour turnover and reduced recruitment costs; but also increased productivity and higher profits.

Subsidies

The vast majority of incentives for steering the training decisions of employers come in the form of direct subsidies – which is likely because they are a very flexible tool that can easily be adapted to specific needs and circumstances. This also means, however, that subsidies come in many shapes and sizes, and that it is not straightforward to classify them. The discussion that follows nevertheless attempts a distinction between those that: i) incentivise employers to provide work-based learning opportunities; ii) encourage them to take on and train unemployed individuals; iii) get employers to train existing workers; and iv) seek to achieve joint solutions between several employers.

Most subsidies targeted at employers remain general and do not target specific skills. The risk with this approach is that valuable resources are spent on training that is not directly relevant to current or future labour market needs. On the other hand, it allows for more flexibility in the identification of training needs, both on the part of employers and on the part of government, especially at the local level. While certain programmes do target specific skills, there is no robust evidence to indicate whether this is effective or even desirable.

> For example, in the case of the Walloon Chèque Formation (a training voucher which employers can purchase at a subsidised rate), some of the vouchers are targeted specifically at green and language skills. Feedback on the programme suggests that these vouchers create more administrative burden while making little difference in practice since such training may be purchased via a general voucher anyway (despite the fact that the green and language vouchers may be purchased in addition to the maximum limit of general vouchers). However, robust evaluations would be needed before definite conclusions can be drawn.

146 Cedefop (2012), op. cit.

147 The leave granted corresponds to 1/3 of the effective duration of the training (includes: participation in courses, preparation and participation in exams, writing of dissertations, accomplishment any other work related to training). Source: presentation provided during the third thematic seminar by Mr. Carlo Frising (Chambre des salariés Luxembourg).

Small and medium-sized firms are the most likely to encounter barriers to training, and the flexibility provided by subsidies makes them an effective tool for targeting SMEs and, thereby, reduce the extent of deadweight loss associated with public funding for training. Many of the subsidies discussed below do, in fact, have a SME focus, either by being exclusively targeted on them, providing more generous subsidies, or allowing more flexible funding arrangements. That being said, systematic targeting may be administratively complex and expensive, and so a tradeoff arises between reducing deadweight, on the one hand, and red tape, on the other – just like in the case of subsidies for individuals.

- Some programmes are targeted exclusively at SMEs. Some of these are designed to help SMEs overcome cost barriers (e.g. Chèque Formation in Wallonia, Belgium; Profi!Lehre and Weiter!Bilden in Austria) specifically seek to help them grow and become more competitive through skills investments (Industry Skills Fund in Australia, KMO Portefeuille in Flanders, Belgium). In this context, the Formação-Ação in Portugal focuses on a particular barrier to SME growth, namely management skills.

- Another group of programmes is open to firms of all sizes, but provides larger subsidies to SMEs. For example, the Crédit-Adaptation in Wallonia (Belgium) offers € 6-7 per training hour to large firms, and € 9-10 to SMEs. In France, employers with fewer than 250 employees receive an additional € 1 000 subsidy if they take on an apprentice. In Finland, the precision training offered as part of the Joint Purchase Training covers 30-50% of the costs, depending on the size of the company. In Latvia, the training support for enhancing the competitiveness of enterprises covers 80% instead of 60% of the costs of general training and 45% instead of 35% of the costs of special training when the firm is an SME. In Poland, grants awarded through the National Training Fund [148] cover 100% of the costs of lifelong learning for micro-enterprises, compared to 80% for all other firms (OECD, 2017).

Subsidies for work-based learning

Apprenticeships (or traineeships) offer a useful solution to the problem of labour market steering since provision adjusts more or less automatically to the (immediate) needs of the labour market. However, there are a range of reasons why the supply of apprenticeship places may be below the socially optimal point, and therefore many countries provide financial incentives for employers to take on apprentices. Such incentives are particularly common during times of economic crisis, when employers have a tendency to reduce the number of apprentices they take on (ILO, 2012).

- Austrian companies have a clear incentive to invest in apprenticeship training: not only does it allow them to meet their future need for qualified skilled workers, but apprentices also carry out valuable work during their training. It is therefore right that employers should bear a significant share of the cost of apprenticeship training. In Austria, the school-based part of training is financed by the government, while the company bears the cost of work-based training. The latter consists primarily of apprenticeship remuneration which tends to be laid down for each individual occupation in collective bargaining agreements. Despite the fact that there are significant benefits to employers from investing in apprenticeship training, the Austrian Government provides a wide range of subsidies that strengthen employers' incentives to take on apprentices. First, there are a number of tax incentives in place: health insurance contributions are waived in the first two years of the apprenticeship; and contributions to accident insurance are waived for the entire training period. Second, the company can apply for a basic subsidy at the end of every apprenticeship year: three gross apprenticeship remunerations for the first year; two gross remunerations for the second year; and one gross remuneration for the third and fourth years, respectively. The government also provides subsidies to try and improve the quality of apprenticeship training (including continuing education and training for trainers; additional tutoring courses for apprentices with learning difficulties; and subsidies for inter- and supra-company training alliances) and to boost the share of young women and disadvantaged youth. In addition, the government lays on guidance, counselling, care and support services targeted in particular on sectors with few training companies. Finally, there are a range of local initiatives as

148 See, Krajowy Fundusz Szkoleniowy.

well, like Profi!Lehre – Die Förderung für Lehrlinge mit Potential in Styria which targets apprentices in technical professions in SME's in the fields of production, skilled crafts and enterprise-related services. The subsidy covers 70% of the cost of external training courses up to limit of € 3 000 per apprentice (maximum five apprentices per company) [149].

Subsidies to train existing workers

Another set of subsidies helps employers with the training of their existing workforce. Again programmes differ widely in the extent to which they target specific skills. Some programmes leave the identification of specific training needs entirely to the employer and have no targeting element at all (e.g. the Czech Republic's POVEZ, the SME Portfolio in Flanders, Belgium), while others target very specific skills. For example, Scotland's Low Carbon Skills Fund gives businesses with under 100 employees the opportunity to apply for up to GBP 5000 towards employee training costs in areas such as renewable energy and low-carbon technologies, energy efficiency, waste management and reuse, and reducing carbon in supply and energy management. Up to 50% of employee training costs are funded, with a ceiling of GBP 1 000 per employee. In Portugal, the Programa Formação-Ação focuses on management skills and, in Brussels (Belgium), the ICT Cheque is a voucher that covers 100% of the cost of ICT training courses (up to a maximum of € 2 240). However, such programmes are rare and it is not clear that they have strong value-added, as the experience with the Chèque Formation for eco-climate and language vouchers in Wallonia (Belgium) has shown.

Other measures

- The Law Decree No. 34 of 19 May 2020 (art. 88) and Law Decree No. 104 of 14 August 2020 set up the New Skills Fund (Fondo Nuove Competenze) under the premises of ANPAL (the National Agency for Active Labor Market Policies). The Fund has the goal of raising the level of human capital in the labor market, offering workers the opportunity to acquire new or greater skills and equip themselves with the tools to adapt to the new conditions of the labor market, and supporting companies in the process of adapting to new organisational models and production determined by the epidemiological emergency from COVID-19. he Fund supports companies and workers in training activities to face companies changing organisational and production needs. Companies and employers can implement specific collective agreements with the most representative trade unions to reshape working hours in order to respond to changing organisational and production needs of the company or to encourage workers' relocation paths, with which part of the working time is aimed at the realisation of specific programs for the development of workers' skills. The intervention, therefore, is targeted to workers whose working hours have been reduced due to participation in skills development courses. The Fund reimburses companies the cost of the reduced hours allocated to attend these courses, including social security and welfare contributions. Collective agreements must identify the employer's needs and may provide for the development of skills aimed at increasing the worker's employability (also with a view to relocation to other situations). The maximum limit is 250 hours for each worker. The agreements must be signed by 31 December 2020 and provide for:
  - the specification of training projects, aimed at developing skills;
  - the number of workers involved;
  - the number of hours (during working hours) to be allocated to training;
  - in the case of training provided by the company, the demonstration of the training capacity requirements (technical, physical and professional) [150].

Training levies/funds

Training levies are used in some countries as a way to pool resources from employers and earmark them for expenditure on training. They are a form of collaborative solution, but differ from those that were discussed above in that, generally, they do not involve a government subsidy.

149 Source: Austrian response to the OECD questionnaire on "Addressing Skills Shortages and Mismatch Through Financial Incentives".

150 The fund has an initial endowment of €230 million, increased by a further €200 million for 2020 and another €300 million for 2021, reaching a total of €730 million. Th social partners were not involved in designing the measures. Trade unions will, however, be strongly involved in the implementation of the measure, as the access to the Fund is subordinated to the stipulation of a company agreement with the most representative trade unions. Source: Eurofound (2020), *COVID-19 EU PolicyWatch Database of national-level responses*

Training levies can emerge either from public policy or from the initiative of social partners. Given the focus of the present chapter, only the former type of levy schemes are considered here – although it is not always easy to draw a neat distinction between the two. For example, in the Netherlands, sectoral training funds (Opleidings- en Ontwikkelingsfondsen) are set up and managed by the social partners. However, by extending collective agreements, the Minister of Social Affairs and Employment can effectively impose a training levy to the entire sector (SMITH, BILLETT, 2003). Similarly, in Switzerland, the government can make participation in a training fund compulsory for all firms in a sector (BRISBOIS ET AL., 2009). In Italy, while inter-sectoral bilateral training funds were instituted by law and need to be approved by decree, they are both set up and run by the social partners without government involvement. Similarly, in the United Kingdom, sector skills councils were a government policy, but they needed to be set up on the initiative of employers.

The main purpose of levy schemes is to address the concern that training firms have their workers "poached" by non-training ones. Training levies "mutualise" financial resources and use them for the common good: they mitigate the "free-riding" problem by reshuffling money from employers who invest little in training to those who invest a lot. As a result, training levies can promote higher levels of employed sponsored training by helping to overcome this type of market failure.

The extent to which training levies are able to incentivise additional training depends on the exact design of the scheme. There are many variants of levy schemes, and below are some of the most common ones:

- Levy-grant schemes, by contrast, do create an incentive for employers to invest in training – not only because employers can only get their contributions back if they apply to the fund for resources, but also because they can get grants larger than the levy they paid. Such schemes can also help address labour market needs by making grants conditional on training in specific skills. The disadvantage of levy-grant schemes is that they require many case-by-case decisions, and therefore imply higher administration costs. The process of grant applications might also be more burdensome for small firms, and, therefore, puts them at a disadvantage in terms of accessing resources from the fund. One example of this model is the inter-sectoral training funds in Italy. Employers wishing to run vocational training projects must apply to the head office of the relevant intersectoral training fund, where a technical team will evaluate the application, including whether it takes into consideration the priorities established by the fund. Other countries where such schemes operate include Denmark (Kompetenceudviklingsfonde – Skills Development Funds), Greece, Poland (National Training Fund – Krajowy Fundusz Szkoleniowy).

- Finally, there are levy-exemption or train-or-pay schemes, under which a tax is imposed on employers, but which is reduced by the amount that enterprises spend on allowable training activities. The incentive for employers to invest in training lies in the fact that the cost of training is reduced to zero up to the amount of the tax liability. In Hungary, for example, firms can reduce their compulsory VET levy by up to 16.5% to co-finance their employees' vocational and foreign language training. In Greece, the contributions to the recently established ELEKP training fund are used to organised training programmes in which firms decide to participate or not.

Box 2: A focus on sectoral training funds

"A 'training fund' is a dedicated stock or flow of financing outside normal government budgetary channels for the purpose of developing productive skills for work.[151]*"*

Training funds in the EU are very heterogeneous. The differences concern the governance models (bipartite or tripartite nature), the number of funds established per country, the type of (education and training) activities and target groups supported, and the way the money is collected and redistributed [152].

Training funds may be created voluntarily and managed by social partners, as part of collective agreements at sectoral level (e.g. Denmark, France, the Netherlands). In some countries, this may result in a high number of training funds covering the majority of economic sectors (e.g. approx. 90 training funds in the Netherlands), whereas in other countries, training funds may be present only in a few, particular sectors (e.g. UK, Germany). Finally, some countries opt to create a single national training fund, governed by the State, often in partnership with social partners (e.g. Cyprus, Spain).

Beyond these two basic types of trainings funds (national and sectoral), other solutions can be found among EU countries. Training funds in Italy, for example, allow for the voluntary association of employers linked to a particular subfield of the economy or a particular occupational or professional field (inter-professional funds). The funds, therefore, do not correspond to established economic sectors and their particular industrial relations (e.g. with regard to wage bargaining).

Training funds source their income mainly as compulsory training levy on company payroll. However, there can be also other, additional sources, e.g. national/regional government own resources collected via general taxation, EU funds (ESF), interest, donations or voluntary contributions. In some countries, the function of training fund has been adopted by the public employment service, where employers and employees co-fund training of employees as part of their overall contribution to the unemployment insurance system.

Training funds typically collect financial resources from all companies (in the economy or sector), irrespectively of the levels of their training investment, and redistribute the collected funds back to companies for training purposes ('pay and receive', 'levy-grant' mechanisms). Alternatively, training funds collect financial resources only from the companies which do not meet a predefined minimum level of training activity/contribution ('train or pay', 'levy exemption' mechanism) and create training opportunities with the means collected. The collected funds may be redirected to:

- employers via different subsidy-schemes, in which case co-financing from employers may be required;
- employees via different subsidy-schemes or through supply side funding, in which case co-financing from employees may be required;
- unemployed via supply side funding or work-based learning. In the latter case, co-financing from the employer providing the training may be required.

151 Johanson, Richard. (2009). A review of national training funds World Bank <http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Labor-Market-DP/0922.pdf>. World Bank., 3.

152 Training funds main features (Cedefop presentation provided during the third thematic seminar informing the present report": (1) they are based on training levy (usually on company's payroll); (2) they are typically, set at national level (often based on tripartite governance; levy defined by law) or sectoral level (based on collective agreements; bipatite governance; levy defined by sector); (3) Distribution of funds: supply-side funding (funding training institutions, specific training programmes) - demand-side funding (grants for companies, reductions in company levy); (4) Multifaceted organisatons playing important role in financing, governance, quality assurance, relevance and provision of CVET.

Training funds may have a single purpose, but most have multiple objectives, such as: pooling the resources for training from various sources, distributing the costs of training between employers and employees, building training capacities, increasing the volume of company training, avoiding the free-rider problem[153], ensuring access to training for disadvantaged groups or developing competitive training markets. Sectoral training funds are usually set up to respond to specific sectoral training needs.

Training funds are among the oldest funding instruments supporting training/adult learning. They were established in the 1960s and 1970s in many countries. While some countries have discontinued their schemes, others have introduced training funds in the past decade.

Highlights from the interviews and online survey

Belgium | Name of the instrument (local language): Paritair Opleidingsfonds voor Elektriciens. Companies in the electro-technics sector are obliged by national law to contribute a fixed share of their payroll costs (0.75%) to a training fund and may receive contribution to their training costs in return. Courses provided by the fund´s training centre are free of charge and employers receive compensation for the loss of working time. Each company gets a training budget per employee of € 15.50 per training hour with a maximum of 8 hours each year (€ 124 per year). The instrument resulted from the multi-employer sectoral agreement between Synergrid FEBEG and ACV-CSC-Electricity and Gas, ACOD-Gazelco, ACLVB-Gas and Electricity.

Netherlands | *"Training funds (financed by social partners) are crucial in carrying out researches at sectoral level concerning skills and labour market dynamics. (...) For adults who would need a formal diploma and the workplace training, the training is paid by social partners, by employers and trade unions together, by training funds. In the training funds, social partners are also involved in designing the incentives and the funding for training. Social partners are also involved in evaluating the effectiveness of the incentives provided for the skills provisions and other innovative actions". [Representative National Trade Union Confederation – NL]. "In the Netherlands could be detected a huge shortage of technical skills and the Dutch employers' federation highlighted that there is a need that 4 out of 10 students should be involved in technical education to close the gap. Moreover, a lack of high-level digital skills should be addressed. In addition, life-long learning and training on the job should be strengthened in the Netherlands: it not an issue of money (thanks to several sectoral funds) but concerns the right incentives to be given for employees to have cross-sectoral learning programs. The Dutch employers' organization is not directly involved in training provision but is engaged together with national trade unions in providing guidelines for sectoral organization in this field. Financial incentives and funding for workplace training in the Netherlands are organized at a sectoral level thanks to sectoral funds which provide enough money for training purposes."* [Representatives of Dutch employers' federation - NL]

Example a fund active since 2013 for young people entering the labour market. The main responsible body for the fund is the Ministry for Education, Culture and Science and it is developed by social partners and has been implemented by Dutch municipalities and their social partners. The aim of the measure is to help graduates from tertiary level education to gain working experience, thereby making them more attractive for employers. The instrument aims to solve the issue of graduates from tertiary level education (WO and HBO degrees in the Netherlands) not being able to find work due to lack of work experience. Often employers do not have the financial capacity or desire to take on an employee with no practical work experience. The instrument aims to enable graduates to acquire work experience through subsidized internships at enterprises, thus making them more attractive in the labour market. Without practical working experience, labour market information shows that graduates leaving tertiary education do not have the relevant skills and practical work experience that enterprises are looking for. Therefore, hiring a fresh graduate represents a risk for enterprises, as they must invest time and money to train a graduate to work in their enterprise. The rationale of the instrument is that by subsiding the

153 When a company does not provide training yet poaches workers trained by another company.

training of graduates, it is more attractive for enterprises to hire them. Moreover, graduates gain work experience, making them more attractive on the labour market as a whole. Furthermore, having trained at an enterprise, a graduate has higher chances of being hired there. Overall, the main purpose is to help graduates find work more easily. The measure helps make graduates become more employable by giving them the opportunity to gain practical experience in their field. In this way they gather the practical knowledge and skills required to actually practice the profession they studied for, thereby reducing the mismatch between what graduates know and what they are expected to be able to do when working in their field. The instrument, therefore, contributes to lower the skills mismatch by improving the initial employability of graduates. It is developed by social partners and has been implemented by Dutch municipalities and their social partners.

Training and development fund for temporary work agency sector. As in many other sectors, employers in the temporary work sector are obliged, based on a collective agreement, to contribute a share of their payroll (0.2%) to a training fund. In return, they receive a grant for their training related activities. The fund implements several schemes: training vouchers, grants for providing mentors for apprentices, licences for e-learning modules for employees with low literacy, financial contributions for the validation of experience. The ESF supports the training fund. The fund is co-managed by the employer organisations and the trade unions, overseen by the Ministry of Social Affairs.

Austria | Social and further training fund for temporary work in Austria: on 1 January 2014, the new law provided for the establishment of a 'social and further training fund'. It is the first national training fund in Austria. A similar fund had already been established for blue-collar workers, but based on a collective agreement. The new fund is based on a national law and will apply to both white and blue-collar workers. Agencies that offer temporary work are obliged by law to contribute a fixed share of their payroll costs (2014: 0.35%; by 2017: up to 0.8%) to a training fund and may receive partial reimbursement of their training costs such as course fees and wage costs. Agencies can receive subsidies up to 100% (occasionally 200%) of their contributions to the fund. Former temporary agency workers (currently unemployed) are also eligible for training subsidies (under specific conditions). The fund is managed by social partners (representatives of employers and employees). The Federal Ministry for Labour, Social Affairs and Consumer Protection plays supervisory role.

France | *"As for relevant supportive policies in the field of access to training, in France recent reforms concerns the individual learning account (Compte Personnel de Formation), the bilateral training funds (OPCO) and other important tools at a regional, company and individual level aimed at supporting workers in the identification of skills gap and at promoting access to training. Social partners role: they produce agreements at a national level concerning training issues, they are involved in the legislative process, but are not involved in negotiation at company level concerning training issues (at a company level they are consulted); they can have a strong role in tripartite or quadripartite bodies at a national or regional level and they manage the OPCO."* [Representative of Union nationale des syndicats autonomes (UNSA)]

Portugal | *"For CCP in the system of training funds, the role of social partners is lower than it should be, because they do not manage the financial issues unless they are directly involved in training as providers. For CIP, we are social partners, and we think if we defend and believe on social dialogue, I think a much better intensive discussion should be held between the government and the social partners and not just to have a formal request of consultation, know a strogner social dialogue, but not directly manage the funds (like Nordic countries do, where the government is a spectator)."* [Representatives of Confederação Empresarial de Portugal (Business Confederation of Portugal – CIP) - Confederação do Comércio e dos Serviços de Portugal (Confederation of Trade and Services of Portugal – CCP).

Sectoral example | In the recruitment sector that are bipartite training funds in place in six countries (Belgium, France, Italy, Luxembourg, Netherlands, Switzerland). In 2016, these funds led to 400,000 workers being trained in response to evolving skills needs of the sectoral labour market.

4.3. What does the survey say?

Thanks to the online survey it has been possible to gather information about respondents' views and perceptions about the financial incentives for research and development and skills development. In the first-place interviewees were asked to express their opinion about the current role of Social Partners in helping to design and/or encourage incentives for research and development and skills investments by employers in their workforce. Table 11 provides an overview of options selected by respondents with a breakdown for their organisational affiliation.

Table 11: Perceived role of Social Partners in helping to design and/or encourage incentives for research and development and skills investments by employers in their workforce [154]

	Number of replies received	An Enterprise/ workers' representative	An Enterprise/ employer's side	An Employers' Organisation	A Trade Union
They have a consultation role	17	1	1	7	8
They have a marginal role	15		2	2	11
They play a significant role	14		2	6	6
They have a quite relevant role	14	1	3	8	2

With reference to cost-sharing approaches (public-private, and/or between Social Partners) to training provision within interviewees' country/sector half of respondents (32) declared to be not aware of any initiative in this field, while the other half of the panel provided positive feedback about their awareness. Subsequently, it has been possible to gather the following examples of cost-sharing approaches entered autonomously by respondents[155]:

- Sectoral training funds (the Netherlands)
- The Swedish Transitions agreements and Job security councils.

Interviewees who selected "no" to the question above were further asked "If there is not currently a cost-sharing approach, do you think that introducing one could help to increase investment in training (including in the form of incentives encouraging employers to invest)?" and the majority of respondents provided positive feedback (Yes)[156].

The survey continued with a question concerning respondents' knowledge about their organization/union/company involvement in measuring the effectiveness of the incentives in terms of skills development and strengthening of innovation[157]: in the majority of cases interviewees provided a negative reply (39), in 14 cases they selected "maybe" and thanks to the 11 interviewees who selected "Yes" it has been possible to gather a few examples in this field as below:

- Responding to interviews linked to studies about training [TU rep. - Spain]
- By participating in training funds [TU rep – the Netherlands]
- By participating in Monitoring Committees supervising the operational programmes [EMPL rep. - Italy]

154 In four cases respondents entered autonomously their opinion. Two replies are considered not valid. In other cases, one respondent form a Danish employers' organisation stated "Employers have a significant role - not Social partners", while a trade union representative (Estonia) said "trade unions have a marginal role".
155 Not compulsory question.
156 "No" replies belong to three trade union representatives in Estonia, France and Spain.
157 "As for your knowledge, Has your Organization/Union/Company ever been involved in measuring the effectiveness of the incentives in terms of skills development and strengthening of innovation?"

- An evaluation of the last reform concerning training is planned for 2021 and French Social Partners initiated a work programme in order to reflect on the measurement of the impact on companies of the « Bill for the freedom to choose one's professional future » promulagated on Septembre 5th, 2018 [EMPL rep. - France]
- We monitor innovation impact on customer product rating and market expansion [Company level respondent - EMPL]
- Law regulating collective access for employees to continuing training, individual training leave, existing competence centers (eg. construction sector) [TU rep [158] - France]
- Interprofessional training funds [TU rep. - Italy]
- Training financed to a large extent with the professional training fee paid monthly by companies and workers [TU rep. - Spain]

Moreover, we asked respondents which kind of resources, besides the financial ones, could encourage employers to invest in research, innovation and up-skilling their workforce and supporting employees to acquire the skills and qualifications adequate to meet the innovation challenge both now and in the future. The following list provides an overview of the recurrent replies registered [159]:

- collaborations with startups, universities, research centers, participation in clusters, etc.
- Facilitation/Counselling [160]/guidance through networks and alliances
- General business environment, legal certainty, business-fiendly policies
- Recognizing the value of innovation to retain and build the customer base. we run a lot of research on this
- Appropriate policies for professional and personal development in the medium and long term
- Support structures for SMEs, greater co-responsibility in the sharing of the functions associated with the training process (prioritization, offer coordination, evaluation ...), and recognition of the training role of the company
- Employers themselves need training to become aware of the importance of training for the productivity of the company, to guarantee its future
- Increased competitiveness, differentiation from the competitors
- Penalties for employers in the event of non-compliance with their obligations

158 Chambre des salaries.
159 Non-compulsory question. Brief paragraph reply option (autonomous entry by respondents). "Recurrent" refers to similar replies entered by at least 2 respondents.
160 Addressing also SMEs peculiarities.

PART 3.
COMPARATIVE ANALYSIS

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5. COMPARATIVE ANALYSIS OF TARGET COUNTRIES OVER THE THREE TOPICS

The chapter will assess the state of play on skills, innovation and training based on both the statistical and documentary research on the topics prior to the present report conducted in the selected countries, The present section provides a discussion on the innovation and training nexus. A comparison between national performances on innovation, (adult) skills and training is then supplied in the next paragraphs. A comparative analysis of the most recent indicators will follow. Finally, the section will assess how and why, and the extent to which, national collective bargaining systems are dealing with innovation and training aspects.

As mentioned in the section devoted to 'methodology', in terms of geographical coverage, the report adopts a European wide perspective with the following specifications: 15 countries[161] have been the focus for the identification of good and less good practices through desk research and contacts with national social partners. Stemming from this list, six countries will be subject to an in-depth comparative analysis. These six countries are: Sweden, Germany, Estonia, France, Italy, Romania.

The list of countries included in the preliminary mapping exercises and in the overall research process has been designed (1) considering comments and suggestions made during the initial stage of discussion with the European cross-industry social partners and (2) taking into account innovation and training assessment tools and indicators which are usually chosen as proxies to analyse innovation and training performances and monitor progress to define EU innovation and training related policies. Namely, the main sources informing the list of countries are:

- the European Innovation Scoreboard (latest edition[162]);
- the Social Scoreboard for the European Pillar of Social Rights (latest available online data for each selected indicator);
- the Digital Economy and Society Index (DESI).

Moreover, in addition to the availability of indicators and updated data on the topics of interest for this report (mainly those contained in the databases listed above), a geographical criterion was also adopted in terms of representativeness of the countries considered in the usual quadrants referred to for a European wide analysis and in order to illustrate examples relevant to the different national industrial relations systems as for the consolidated classification by Visser[163].

PROVISION OF AND ACCESS TO TRAINING TO SUPPORT INNOVATION: THE ROLE OF SOCIAL PARTNERS AND COLLECTIVE BARGAINING

As already mentioned in the section 2 (Part 2) several market failures often prevent that the costs and benefits from workplace training are efficiently shared between employers and employees (OECD 2003). Brunello (2020) highlights deviations from perfect competition and credit constraints among the causes of underinvestment in training in Europe. The market alone would henceforth provide societies with an insufficient amount of training, and public intervention is recognized as necessary at least since the Copenhagen Declaration in 2002 (European Commission 2002). Also because continuing vocational training is generally less state-regulated (Heidemann 1996), a key role is performed by social partners (Winterton 2007), who help to identify skill needs (Cedefop 2008). Collective bargaining should thus emerge as a primary arena of training decisions (Eurofound 2009). It is hence surprising that in Europe the share of firms providing CVET through collective agreements is generally below 10% (2015 Eurostat data), with enterprise-level agreements even less common than sectoral or national ones (Heyes 2007).

161 Austria, Bulgaria, Denmark, Estonia, France, Germany, Italy, Luxembourg, the Netherlands, Poland, Portugal, Romania, Spain, Sweden, United Kingdom.
162 During the writing of this report, the 2019, 2020 and 2021 versions were consulted. The 2019 version provided the basis for the selection of indicators, while the two subsequent publications were used for the collection of secondary data.
163 Visser, J. (2009), The quality of industrial relations and the Lisbon Strategy, in European Commission, Industrial relations in Europe 2008, Publications Office of the European Union, Luxembourg, pp 45–73.

Considering the most recent data and the countries analyzed in this report, in 2015, 70.5 % of enterprises employing 10 or more persons in the EU-27 provided CVET to their staff (Eurostat 2015); this marked an increase compared with 2005 and 2010 when the corresponding shares were 55.6 % and 63.6 % respectively. A 2020 European Commission study on adult learning also observed that 90% of job-related training in the EU is funded by employers. Among the six EU Member States in analysis, the share of enterprises that provided such training in 2015 ranged from 26.7% in Romania to 93.1% in Sweden (22.6 percentage points higher than the European 27 average and 20.4 percentage points higher than the average of the 15 countries considered).

It is possible to evaluate the performances of the countries in question also with reference to the provision of training dedicated to the development and updating of ICT skills: in 2020 the states belonging to the geographical quadrant of Northern Europe, primarily Sweden (32%), show the highest percentages of companies engaged in the provision of this type of training. Among the fifteen countries considered, only Denmark shows higher values in the range of the Swedish ones (30%), while Italy (15%), Romania (7%) and Bulgaria (6%) close this ranking with significantly lower values (Figure 1).

This is particularly significant when we consider the theme of skills for innovation, as for the European Innovation Scoreboard it is possible to state that ICT skills are particularly important for innovation in an increasingly digital economy and that this indicator is also examined by the European Innovation Scoreboard (latest edition 2021). In this sense, the data relating to the percentage of companies providing training (and, in particular, those dealing with ICT skills training) also reflect the positioning of the countries in question in the ranking of innovation.

It should be mentioned that joint priorities for adult learning can be established at enterprise level, for example through involving staff representatives in setting the objectives of training. Data from the European Continuing Vocational Training Survey (CVTS, 2015) show that the involvement of staff representatives on this topic, considering target counties, is generally highest in France, Luxembourg, and the United Kingdom and smallest in Romania and Poland. Moreover, larger companies involve staff representatives more often in setting training objectives than SMEs, although the dispersion varies across countries. For example, in France, 54% of large companies involve staff representatives and 8% of small companies do. In the United Kingdom, on the other hand, the dispersion is much smaller (27% of large companies, compared to 22% of small companies).

The involvement of social partners in the adult learning system varies strongly across countries. While in some countries social partners are strongly involved in governing and management of the training system, they have a limited involvement in others. Austria, Denmark, Germany, Italy and the Netherlands are countries where, in general terms, social partners define and manage the training system [164]. Social partners are involved in shaping the training system in Belgium, France [165], Luxembourg and Poland, whilst they have a consulting role in Estonia, Portugal, Spain and Sweden [166].

Access to workplace training remains highly dependent on the type of employment contract in place with almost 50% of employees on permanent contracts in the EU receiving training compared to 32% of employees with fixed contracts and 19% of self-employed (European Commission, 2016). This suggests that in many cases those who need access to learning opportunities the most are often those who have the least access to it. At the same time, it can be noted that there are initiatives to provide training to workers on

164 The summary considers the involvement of European social partners in the governance of the education and training systems of their respective countries. While OECD classifies countries into the abovementioned four broad categories, it is important to keep in mind that the degree of involvement is indeed a continuum.
165 The social partners define and manage the training system at the sectoral-level, contribute to the definition of the training system at nation-al/cross-sectoral level and have a consulting role at enterprise-level, sectoral-level and national/cross-sectoral level.
166 For Sweden, the abovementioned OECD classification refers to social partners' role in the public-education system only. Otherwise, looking at different domains (i.e. the social partners' involvement in the Employment Security Councils - collective agreements on transition), Sweden could be included in the first category of countries. The Swedish Job Security Councils (JSCs) are one of the most notable examples where collective bargaining can complement public policies in enhancing labour market security and adaptability: they provide support and guidance to displaced workers, even before displacement occurs, as well as access to training and reskilling opportunities in the case of plant closures and mass layoffs. Source: Engblom, 2017 and online in-depth interviews.

fixed-term contracts. A good example of this is in the temporary and agency work sector where training funds provide opportunities for skills development in a number of countries, including Belgium, France, Italy, Luxembourg, Netherlands and Switzerland.

GAME CHANGING TECHNOLOGIES AND INNOVATIVE APPROACHES TO THE IDENTIFICATION OF NEW SKILLS

In general terms, and as noted by Eurofound (Eurofound 2020) *"game changing technologies*[167] *are so new, assessments of their impact on working conditions can only be preliminary and indicative. The most significant disruption is expected for skills use and skills development due to changes in the task profiles of jobs and in work organisation (notably working time, autonomy, flexibility and control). For workers who manage this transformation well, it should represent an improvement. In contrast, issues around data protection and data privacy might be to the disadvantage of workers".*

Anticipation and forecasting support decisions in areas which involve long lead times, such as education and training, and long-term labour market planning. Skills anticipation offers early warning of evolving skill mismatches, allowing sufficient time for action to counteract them. Anticipating the future is not straightforward, yet it allows the identification of current trends and strategies and their likely implications in the future. The main rationale for skills anticipation is to equip workers and enterprises with the skills that they require relative to new and emerging needs. Better involvement of the social partners is needed in skills forecasting and updating occupational profiles, Information exchange between the labour market actors and education and training on learning outcomes ensures a better match and utilisation of skills. Ideally forecasting it is undertaken within a broader approach, with other elements of economic development, where investment in education, training and quality of jobs is part of the process (Cedefop, ILO, ETF 2016). In more detail, this approach of skills anticipation is paramount for the employability and further development of workers as well as the productive and innovative capacity of enterprises, and should be carried out jointly by, and with, trade unions and employers. Skills anticipation can also be carried out by public and private employment services as well as local and regional authorities which will respectively ensure that the training is in line with territorial current and future demand on the labour market, as well as with a more coordinated national strategy. In this regard, public providers of adult learning, like universities and VET institutions, should also be involved in this process in order to reinforce and adapt the training they offer to these skills needs and thus contribute to developing their region or employment area. (Cedefop, ILO, ETF 2015)

Effective skills anticipation and matching, based on high quality labour market statistical information, can link education, training, employment and innovation. It can encourage partnerships and cooperation to deliver VET skills and qualifications relevant to the workplace and respected by employers (Cedefop 2017). Consequently, Member States use skills anticipation at national and regional levels to support many employment and education and training-related policies. Some use skills anticipation to support other policy areas, such as economic policy in Latvia and the transition to a greener and digital economy in Ireland. Government agencies and public employment services are not the only users of skills anticipation. For example, and considering target countries, in Germany, France and Austria, social partners use skills anticipation to inform decision-making at sector or enterprise level[168].

Policy area	A selection of examples (target countries)
VET curricula and course design	Bulgaria, Denmark, Germany, Estonia, France, Italy, Austria, Poland
Funding and allocation of student places	Portugal, Romania, Sweden
Labour market training policies	Bulgaria, Germany, Spain
Career guidance	Germany, France, Italy, Luxembourg, Netherlands, Austria, UK
Developing occupational profiles and standards	Portugal
Job-matching and services for job-seekers	Denmark

167 Advanced robotics, additive manufacturing (that is 3D printing for industrial purposes), Internet of Things (IoT), specifically industrial IoT (IIoT) and wearable devices, electric vehicles, autonomous vehicles (for example 'driverless' cars), industrial biotechnologies, blockchain (a verifiable record of electronic transactions, and the foundation of crypto-currencies such as Bitcoin), virtual and augmented reality (VR/AR) are the main game changing technologies (GCT) recently mapped by Eurofound.
168 Authors' elaboration on Cedefop data (2017).

Skills anticipation methods vary across the EU; the main ones are skill assessments, forecasting and foresight. Data sources also vary; methods used can influence the data available and vice versa. Some methods are better at describing the current skill supply and demand situation; others at providing long-term projections. Therefore, different forms of skills anticipation have a role to play in shedding light on short-, medium- and long-term skill issues and can support policy making at macro, meso and micro levels. All target Member States use skill assessments or skill audits at national and/or, as in Sweden, regional level. They can provide a comprehensive analysis of current skill needs and possible implications of past trends for the future. Sometimes a sectoral focus is included, such as in Estonia's system of labour market monitoring and future skills forecasting (OSKA)[169]. Hand in hand with skills anticipation methods, it is important that there are feedback loops in place in order that new and emerging skills requirements are better reflected into education and training curricula.

Many Member States also use quantitative skills forecasts. These are usually based on economic models that make assumptions about the many factors influencing the labour market to estimate future developments across sectors, occupations and skills. To be effective, quantitative forecasting needs good quality labour market data with lengthy time series. Building the models and interpreting results also demands time and expertise. Target countries, such as the United Kingdom, use quantitative skills forecasting at national and regional level. Skills forecasting models are well-established in Germany, the Netherlands, Sweden and the UK. Others, such as Estonia, are working to improve or establish new forecasting models and infrastructure.

Other skills anticipation approaches include employer and employee surveys and tracer studies of VET or higher education graduates. The Netherlands monitors the transition into work of school-leavers from most parts of its education system. Ad hoc statistical exercises are also undertaken, frequently focusing on a particular sector. For example, in Italy, Unioncamere (the national network of the Chambers of Commerce) delivers monthly and medium term (4 years) sectoral and regional level forecasts concerning employment and occupational needs.

All methods have strong and weak points. Best practices (target countries examples described in section 3) combine quantitative and qualitative elements that suit national characteristics such as governance structures and policy goals. There is no single best approach, and a mix of methods and tools can provide better results. However, multiple activities, methods and timeframes can be difficult to coordinate. It is important to highlight that all methods rely on quality data. Poor statistical infrastructure, as experienced in some Member States, undermines the effectiveness of skills anticipation. Using imperfect proxies, such as levels or types of qualifications and occupations, to measure skills represents another constraint, of skills forecasting. A job may be in demand but technology, for example, may have changed radically the skills needed.

The extent to which skills anticipation findings can influence individuals' and policy-makers' decisions, depends on establishing effective skills governance. Skills governance matters: many diverse policies can be affected by skills anticipation outcomes and many different stakeholders involved, including social partners at various levels. Each Member State's traditions, practices and administrative structure shape its approach to skills governance. For example, the regional element is strong in Belgium and Denmark; others, such as Bulgaria, have more centralised approaches. Labour and/or education ministries often take or share the lead in skills anticipation activities, working with social partners; public employment services also frequently have a key role. The leading authority strongly shapes the focus, policy priorities and even the time frames (short, medium or long-term) of skills anticipation.

Comprehensive skill strategies that integrate skills anticipation have the greatest potential. Strategies can be national or regional. But integrating the various components of skill formation, such as education and training (including higher education), qualifications and accreditation, active labour market policies and guidance, into an overall strategy is not easy; such broader strategies are lacking across the EU. The role of social partners and other stakeholder differ significantly across Member States, ranging from systematic and active participation in all stages of design, collection and use of skills anticipation outputs to a consultative role or just receiving the results.

169 For a detailed description of national level skills anticipation tools involving social partners, see section 3.

Where social partnership is well-established, trade unions and employer associations usually have an integral role. Other key stakeholders are VET providers and sectoral organisations. Experts usually have a consultative rather than decision-making role. Considering target countries, social partners are closely involved in Luxembourg, which has a strong tradition of "concertation sociale". Countries such as Denmark, Germany, Spain, France, Luxembourg, the Netherlands, Poland, and Sweden are characterised by wide stakeholder involvement, including enterprises, employer organisations, trade unions and sectoral bodies, using various collaboration models. In contrast, in the UK, stakeholders are co-opted on an ad hoc basis to various skills anticipation initiatives.

Formal participation in skills anticipation does not guarantee a meaningful contribution: the degree of involvement and ownership determines the quality of stakeholder engagement. In Germany there are concerns that the many skills anticipation methods pose coordination problems. But cooperation between the many stakeholders remains strong; they accept that interests vary and, importantly, use the findings in policy making. Ensuring stakeholder coordination and consensus is at the core of Luxembourg's approach. In Portugal, stakeholders help develop strategic objectives for skills anticipation.

Effective skills anticipation depends on dissemination of outputs. Use of skills anticipation data and intelligence by others, and not just the commissioning agency, is important. Most Member States disseminate skills anticipation results to a broad audience through mass media outlets including reports, journals, websites, TV, newspapers, seminars and other events. Among target countries, Luxembourg, for example, has a web-based skills portal [170]. The UK's labour market intelligence for all online data portal makes data freely available through a programming interface for use in websites and applications.

Effective dissemination of outputs requires formal processes. For example, Poland's main forecasting tool, the Study of human capital (BKL), includes a clear dissemination strategy and a specific budget [171]. Success in skills anticipation also depends on financing; again, approaches vary. In most Member States, government ministries of education or labour are the main funders of skills anticipation measures. Employer associations and trade unions also commission and fund measures such as employer and employee surveys. The European Social Fund has supported skills anticipation activities in target countries with emerging and established systems, including in Estonia, France, Austria and Romania.

FINANCIAL INCENTIVES FOR RESEARCH AND DEVELOPMENT AND SKILLS INVESTMENTS

Financial constraints are among the obstacles that can prevent adults from participating in education and training. In particular, adults with low levels of basic skills and those with low levels of or no qualifications are most likely to experience challenges in transitioning into work or advancing in their careers, which impacts on earnings and future opportunities (European Commission, 2021). Thus, adult learning policies and measures ought to provide solutions for those who, despite their need for re or up-skilling and/or qualification upgrading, are unable to access and participate in education and training. Supporting individuals in developing more and better skills is a central theme in the recently adopted European Skills Agenda (European Commission, 2020), which calls for considerable mobilisation of private and public investment in skills and training. The overarching adult learning participation objective stipulated in the agenda, which is set at a 50 % participation rate to be reached by 2025, is expected to require an estimated additional investment of € 48 billion annually (ibid.). These additional funds are expected to come from various sources, including the EU budget, including the new Recovery and Resilience Facility, public funds of the Member States and private sources. The discussion of the financial accessibility of adult education and training in this section is divided into three sections. The first section presents quantitative data showing the extent to which financial issues constitute a barrier to adult participation in education and training. The second section discusses funding arrangements related to publicly subsidised programmes open to adults, as well as financial support measures that may help in meeting direct or indirect education and training costs.

170 See: Les qualifications de demain dans l'industrie
171 Dissemination involves annual reports on the BKL website and cycles of national conferences and regional seminars targeting multiple stakeholders

The 2016 Adult Education Survey (AES) allows the significance of funding as a barrier to adult participation in education and training to be evaluated. In the survey, respondents who wanted to participate in education and training (or wanted to participate more) but who encountered difficulties were asked to specify obstacles that hindered their participation. Costs were among the proposed obstacles. Other barriers include identifying the time to take part in training and determining when training takes place, be it during working time or in combination with training out of office hours. Allocating time for training during working time is a particular issue for SMEs. In this regard, a good practice example is Denmark's approach to training funds that are established through collective agreements. If participation in CVET is requested by the employer, employees are entitled to their usual salary from the employer., while compensation is paid to the employer (R. FLAKE ET AL. (2018). Op. Cit.)

On average, across the EU-27, around one in three adults who wanted to participate (or participate more) in education and training (32.2 % [172]) reported costs among the obstacles that prevented them from doing so.

As mentioned previously, the OECD refers to the 'low skills trap' whereby the participation in adult learning and the levels of skills are linked in a mutually reinforcing way (OECD 2013). In other words, "people with higher skills tend to have jobs that require more continuous training, which in turn contributes to their skills" (European Commission 2013). By contrast, low-skilled individuals have more difficulties identifying their learning needs – including in the long-term – and are, therefore, less motivated and less likely to seek out and engage in training (Windisch 2009; OECD 2019).

Considering the detailed information relating to the funding schemes for adult learning included in section 4, the following table intends to provide an overview of the tools available in countries under analysis with specific financial support measures (demand side) targeting or privileging the education and training of low-qualified adults.

Table 12: Financial support measures targeting or privileging the education and training of low-qualified adults and where the support recipient is the learner [173]

Country	Type of measure (including its name, if available)	Description
DK	Danish State Educational Support for Adults (SVU); grant or paid training leave	Directed at adults (as a rule, those aged 25 and above) on leave from their jobs who have little or no formal education (i.e. below ISCED 3).
FR	Personal training account (Compte personnel de formation (CPF))	The least qualified individuals (i.e. those with qualifications below ISCED 3) receive funding of EUR 800 per year for their training activities instead of EUR 500 given to other individuals, with a limit of EUR 8 000 instead of EUR 5 000. In addition, the CPF allows for the financing of support for the validation of acquired experience (validation des acquis de l'expérience).
SE	Grant/loan	Adults who need education/training at levels ISCED 1-3 can receive a higher amount of grant with a share of 67 % of the total support (for other learners, the share is 30 %). The rest is covered by the loan of student's choice.
	Study start-up support (Studiestart-stöd), grant	Support targeting unemployed adults who have not completed basic education (ISCED 2) or upper secondary education (ISCED 3). This support measure was introduced in 2017. For full-time studies, the support can be granted for 50 weeks (SEK 2 246 per week). The aim is to support people with a limited educational background, thereby increasing their opportunities in the labour market.

172 Eurostat AES [trng_aes_178]. Data by educational attainment level show that costs are more often an obstacle to participation for adults with the lowest levels of educational attainment (ISCED 0-2) (36.7 %) than for those holding a medium-level qualification (32.2 % for ISCED 3-4) or a tertiary education degree (30.0 % for ISCED 5-8).
173 Authors' elaboration on European Commission 2021.

Table 13: Financial support measures targeting or privileging the education and training of low-qualified adults and where the support recipient is the employer [174]

Country	Type of measure (including its name, if available)	Description
DK	Danish State Educational Support for Adults (SVU); grant or paid training leave	Directed at adults with little or no education (i.e. below ISCED 3). If an employee is paid his or her full salary, their employer can receive the SVU as salary compensation.
LU	Co-funding of enterprise training	The least qualified individuals (i.e. those with qualifications below ISCED 3) receive funding of EUR 800 per year for their training activities instead of EUR 500 given to other individuals, with a limit of EUR 8 000 instead of EUR 5 000. In addition, the CPF allows for the financing of support for the validation of acquired experience (validation des acquis de l'expérience).
AT	Qualification support for employees (Qualifizierungsförderung für Beschäftigte); programme fees and personnel absence costs	The scheme supports the education and training of three target groups: (1) employees with low levels of qualifications, i.e. individuals who have not completed a level of education above lower secondary level (ISCED 2), (2) female employees who have completed apprenticeship training or a three-year school of intermediate vocational education (Berufsbildende Mittlere Schule) and (3) employees with higher levels of qualifications if they are at least 45 years old. The scheme provides financial support to employers, covering 50 % of the participants' programme fees and 50 % of the personnel absence costs up to a maximum of EUR 10 000 per person and application.
SE	Grant for apprenticeship	A government grant that aims to increase adult participation in apprenticeship programmes at upper secondary level. The grant consists of several parts, including financial compensation for the workplace and for training supervisors. The scheme falls under the system of municipal adult education (komvux). If more adults apply than a municipality has space for, preference must be given to those with low levels of or no qualifications.
UK	Adult Education Budget	The Adult Education Budget (created in 2015) is a government-funded programme that can be used as a resource by employers (as well as other education and training providers) to fund adult education and training actions. The programme subsidises the education and training of various vulnerable groups, including adults with low levels of qualifications. The focus is on: – adults aged between 19-23 preparing for their first level 2 or 3 qualification (refers to the national qualifications framework levels); – adults with low wages aged over 24 preparing for their first level 2 or 3 qualification; – unemployed adults following any course or qualification up to level 2; – individuals with low wages whose first language is not English (to improve their language skills up to level 2).

Additionally, it can be noted that the EU Recovery and Resilience Facility is providing 723.8€ billion for Member States to channel money into training initiatives and infrastructure developments that will enhance skills attainment, with a particular focus on the skills needed for the digital and green transitions. In this case, the focus is on providing training to support the up and re-skilling of adult workers. Examples include investing 2.5€ billion in distance learning tools in France; 881€ million in improving digital pedagogical skills, educational content and equipment in Romania; and 26€ billion in increasing child care facilities, reforming the teaching profession, improving active labour market policies and reinforcing VET in Italy.

174 Authors' elaboration on European Commission 2021.

Table 14 How do target countries compare over the themes prior to the project? A selection of indicators.

Country	Innovation performances (EIS - 2021)	Digital performances (DESI 2020 - Human Capital weighted score 0 to 100) [175]	Individuals who have basic or above basic overall digital skills % of population 16-74 (European Social Scoreboard 2019 -data)	Adult participation in learning % of population 25-64 (European Social Scoreboard – 2020 data)	Enterprises that provided training to develop/upgrade ICT skills of their personnel (percentage of enterprises -Eurostat 2020 and change compared to 2019)		Cost of continuing vocational training courses (Eurostat, PPS – 2015)	Skills Foresight/Forecast systems (Cedefop Matching Skills Portal - examples of policy areas supported by skills anticipation)	Presence of financial support measures targeting or privileging the education and training of low-qualified adults (Eurydice 2021)	Involvement of social partners in the adult learning system (OECD 2019)
AT	Strong Innovator	14,2	66	11,7	18	0	1365	VET curricula and course design		The social partners define and manage the training system
BG	Innovation Leader	8,48	29	1,6	7	-3	363	Labour market training policies		The social partners contribute to the definition of the training system
DK	Innovation Leader	15,3	70	20	30	-1	4685	VET curricula and course design		The social partners define and manage the training system
EE	Strong Innovator	16,7	62	17,1	17	0	908	VET curricula and course design		The social partners have a consulting role
ES	Moderate Innovator	11,9	57	11	20	-2	1063	Labour market training policies		The social partners have a consulting role
FR	Strong Innovator	11,9	57	13	15	-6	2341	Career guidance		The social partners contribute to the definition of the training system
DE	Strong Innovator	14,1	70	7,7 [176]	24	-8	1800	Labour market training policies		The social partners define and manage the training system
IT	Moderate Innovator	8,11	42	7,2	15	-4	1149	Career guidance		The social partners define and manage the training system
LU	Strong Innovator	14,6	65	16,3	21	-6	1838	Career guidance		The social partners contribute to the definition of the training system
NL	Strong Innovator	16	79	18,8	24	:	2154	Career guidance		The social partners define and manage the training system

175 Notation: desi_2_hc. Definition: DESI Human Capital Dimension calculated as the weighted average of the two sub-dimensions: 2a Internet User Skills (50%) and 2b Advanced Skills and Development (50%).
176 provisional.

Country	Innovation performances (EIS - 2021)	Digital performances (DESI 2020 - Human Capital weighted score 0 to 100)	Individuals who have basic or above basic overall digital skills % of population 16-74 (European Social Scoreboard 2019 -data)	Adult participation in learning % of population 25-64 (European Social Scoreboard – 2020 data)	Enterprises that provided training to develop/upgrade ICT skills of their personnel (percentage of enterprises -Eurostat 2020 and change compared to 2019)		Cost of continuing vocational training courses (Eurostat, PPS – 2015)	Skills Foresight/Forecast systems (Cedefop Matching Skills Portal - examples of policy areas supported by skills anticipation)	Presence of financial support measures targeting or privileging the education and training of low-qualified adults (Eurydice 2021)	Involvement of social partners in the adult learning system (OECD 2019)
PL	Emerging Innovator	9,32	44	3,7	18	+5	425	VET curricula and course design		The social partners contribute to the definition of the training system
PT	Moderate Innovator	9,44	52	10	23	-5	566	Funding and allocation of student places		The social partners have a consulting role
RO	Emerging Innovator	8,29	31	1	6	0	396	Funding and allocation of student places		:
SW	Innovation Leader	17,9	72	28,6	32	0	1668	Funding and allocation of student places		The social partners have a consulting role
UK	:		:		24	-5	961	Career guidance		Other

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